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**NATIONAL
COOPERATIVE
HIGHWAY
RESEARCH
PROGRAM**

Mitigation of Ecological Impacts

A Synthesis of Highway Practice

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Mitigation of Ecological Impacts

A Synthesis of Highway Practice

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NTIS

Systematic, well-designed research provides the most effective approach to the solution of many problems facing highway administrators and engineers. Often, highway problems are of local interest and can best be studied by highway departments individually or in cooperation with their state universities and others. However, the accelerating growth of highway transportation develops increasingly complex problems of wide interest to highway authorities. These problems are best studied through a coordinated program of cooperative research.

In recognition of these needs, the highway administrators of the American Association of State Highway and Transportation Officials initiated in 1962 an objective national highway research program employing modern scientific techniques. This program is supported on a continuing basis by funds from participating member states of the Association and it receives the full cooperation and support of the Federal Highway Administration, United States Department of Transportation.

The Transportation Research Board of the National Research Council was requested by the Association to administer the research program because of the Board's recognized objectivity and understanding of modern research practices. The Board is uniquely suited for this purpose as it maintains an extensive committee structure from which authorities on any highway transportation subject may be drawn; it possesses avenues of communication and cooperation with federal, state, and local governmental agencies, universities, and industry; its relationship to the National Research Council is an insurance of objectivity; it maintains a full-time research correlation staff of specialists in highway transportation matters to bring the findings of research directly to those who are in a position to use them.

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The needs for highway research are many, and the National Cooperative Highway Research Program can make significant contributions to the solution of highway transportation problems of mutual concern to many responsible groups. The program, however, is intended to complement rather than to substitute for or duplicate other highway research programs.

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The members of the technical committee selected to monitor this project and to review this report were chosen for recognized scholarly competence and with due consideration for the balance of disciplines appropriate to the project. The opinions and conclusions expressed or implied are those of the research agency that performed the research, and, while they have been accepted as appropriate by the technical committee, they are not necessarily those of the Transportation Research Board, the National Research Council, the American Association of State Highway and Transportation Officials, or the Federal Highway Administration of the U.S. Department of Transportation.

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PREFACE

A vast storehouse of information exists on nearly every subject of concern to highway administrators and engineers. Much of this information has resulted from both research and the successful application of solutions to the problems faced by practitioners in their daily work. Because previously there has been no systematic means for compiling such useful information and making it available to the entire community, the American Association of State Highway and Transportation Officials has, through the mechanism of the National Cooperative Highway Research Program, authorized the Transportation Research Board to undertake a continuing project to search out and synthesize useful knowledge from all available sources and to prepare documented reports on current practices in the subject areas of concern.

This synthesis series reports on various practices, making specific recommendations where appropriate but without the detailed directions usually found in handbooks or design manuals. Nonetheless, these documents can serve similar purposes, for each is a compendium of the best knowledge available on those measures found to be the most successful in resolving specific problems. The extent to which these reports are useful will be tempered by the user's knowledge and experience in the particular problem area.

FOREWORD

*By Staff
Transportation
Research Board*

This synthesis report will be of interest to local, regional, state, and federal officials, as well as to other transportation professionals that work with them in "ecological impact mitigation"; that is, efforts to offset the loss or impairment of functions and values of natural habitats due to the activities of departments of transportation. This report provides an overview of current transportation agency practices, recent literature findings, and research regarding environmental impact mitigation measures, and monitoring and evaluating information for aquatic environments and related habitats, including wetlands, streams, and riparian corridors. Definitions of key terms are derived, primarily, from the FHWA final rule on *Mitigation of Impacts to Wetlands and Natural Habitats* (23 CFR Part 777).

Administrators, engineers, and researchers are continually faced with highway problems on which much information exists, either in the form of reports or in terms of undocumented experience and practice. Unfortunately, this information often is scattered and unevaluated and, as a consequence, in seeking solutions, full information on what has been learned about a problem frequently is not assembled. Costly research findings may go unused, valuable experience may be overlooked, and full consideration may not be given to available practices for solving or alleviating the problem. In an effort to correct this situation, a continuing NCHRP project has the objective of reporting on common highway problems and synthesizing available information. The synthesis reports from this endeavor constitute an NCHRP publication series in which various forms of relevant information are assembled into single, concise documents pertaining to specific highway problems or sets of closely related problems.

This report of the Transportation Research Board contains information culled from initial survey responses from 27 transportation agencies. Ten more transportation agencies responded to a subsequent follow-up survey designed to acquire information not

addressed in the first survey. This information is combined with that from telephone interviews and reviews of applicable literature and ongoing research to address current practices across the nation.

To develop this synthesis in a comprehensive manner and to ensure inclusion of significant knowledge, the available information was assembled from numerous sources, including a large number of state highway and transportation departments. A topic panel of experts in the subject area was established to guide the author's research in organizing and evaluating the collected data, and to review the final synthesis report.

This synthesis is an immediately useful document that records the practices that were acceptable within the limitations of the knowledge available at the time of its preparation. As the processes of advancement continue, new knowledge can be expected to be added to that now at hand.

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Information on current practice was provided by many highway and transportation agencies. Their cooperation and assistance are appreciated.

MITIGATION OF ECOLOGICAL IMPACTS

SUMMARY

Compliance with federal, state, and tribal regulations is the driving force behind the development and implementation of ecological mitigation projects by state departments of transportation (DOTs). An objective of this study is to document the current practices of transportation agencies in implementing ecological mitigation measures for highway projects as they apply to aquatic, wetland, and riparian habitats. This synthesis summarizes available information on the types of ecological impacts incurred by highway projects and the methodologies used to assess these impacts, procedures for determining the need for mitigation and monitoring, types of mitigation implemented for different impacts and how mitigated sites are monitored, methodologies for the evaluation of mitigation success or failure, and the costs of mitigation.

Most mitigation projects are performed to comply with specific conditions of the Clean Water Act of 1972 Section 404 permits, State Section 401 Water Quality Certifications, and state wetland permits. Compliance with the Endangered Species Act of 1973 and related state and tribal regulations also frequently require specific ecological mitigation projects to minimize impacts to listed species. Mitigation measures are also developed through the National Environmental Policy Act (NEPA) process to minimize effects on natural resources. The mitigative measures become part of the Record-of-Decision for the NEPA document and are incorporated into project designs. Examples include wildlife and fish passages that maintain the roadway, yet reduce roadkill; fish passages that maintain migratory pathways for finfish; and habitat enhancements within roadway right-of-ways.

Environmental initiative programs adopted by some DOTs are another source of ecological mitigation projects that are performed to satisfy a local need identified by a community or agency. The mitigation projects developed through these programs are not necessarily performed to satisfy permit conditions. Rather, they serve as one method to rectify existing environmental problems, including those caused by past transportation projects. The American Association of State Highway and Transportation Officials has established the Transportation Environmental Stewardship Pilot Program to encourage and support more DOTs in the development of their own environmental stewardship programs. Twenty-three DOTs have signed on to this program.

At present, there are no standardized ecological impact and mitigation assessment methodologies used by all DOTs. Several DOTs, including Minnesota, Montana, Wisconsin, Georgia, South Carolina, Florida, and the New England states use regional standardized qualitative methods to assess wetland impacts because they are easy to use, economical, and accepted by regulatory agencies. In the absence of a standardized method, other DOTs rely on best professional judgment to assess wetland functions and potential impacts.

The regulatory requirements for ecological mitigation vary between regions of the country, as well as between states within a region. Mitigation requirements reflect regional concerns, specifically defining the types of mitigation approaches that are acceptable and those

that are preferred by regulatory agencies. With a few exceptions, districts of the U.S. Army Corps of Engineers (USACE) have defined how the policy of “no-net-loss” of wetland functions is implemented within their individual regulatory boundaries.

Ecological mitigation requirements for wetlands and streams are often determined using mitigation ratios established by regulatory agencies on the assumption that no-net-loss of wetland and stream functions will be achieved. Mitigation efforts for other resources (e.g., threatened and endangered species and critical habitats) are negotiated on a case-by-case basis. DOTs typically use resource-specific studies and best professional judgment to assess ecological impacts to aquatic biota, wildlife, and special status species.

A few USACE districts and state and tribal regulatory agencies require DOTs in several states, including California, Oregon, Washington, Kentucky, Tennessee, North Carolina, Virginia, West Virginia, and Pennsylvania to mitigate for stream impacts by providing specific mitigation in the form of stream restoration activities, whereas other DOTs do not face such regulatory requirements. DOTs in Maryland, New York, North Carolina, and Virginia have initiated programs that provide funding and support for stream restoration projects either through environmental initiative programs or by providing funding to state resource agencies.

The cost of mitigation projects is viewed by transportation agencies as part of the “cost of doing business.” In general, DOTs are only just beginning to develop databases to track the costs of mitigation efforts. Earlier efforts to document mitigation costs focussed on wetland mitigation projects and showed that project costs can vary significantly among sites and regions. Correspondingly, the cost for long-term monitoring and management also appears to vary widely. The costs for other forms of mitigation were not well documented in the literature, probably because these costs are not tracked separately and are incorporated (lost) in the overall project construction cost.

Transportation agencies are looking for more flexibility in the approach to mitigation that will more readily allow for out-of-kind and alternative forms of mitigation. Some of the options identified by DOTs include easier access to wetland mitigation banks, use of in-lieu fees, consolidated mitigation projects, mitigation credit for combinations of mitigation approaches (restoration, creation, enhancement, and preservation), and compensatory mitigation credit for improving or providing wildlife underpasses/overpasses and fish passage devices. Although some DOTs are making use of this type of arrangement, many are not because of funding or regulatory restrictions. These approaches reflect a general viewpoint of transportation agencies to remove themselves from the long-term commitments and costs required by wetland and habitat mitigation projects.

A perception exists among some transportation agencies, especially those in the interior west, that technical information regarding wetland/habitat mitigation and stream restoration issues is not easily attainable and generally provides poor coverage of regional issues. Within the limits of the literature search performed for this synthesis, technical information regarding ecological mitigation topics such as tidal and freshwater wetland mitigation was abundant, and technical information for stream restoration and fish and wildlife passage was also well represented. However, within the recent literature, there appears to be far more information on mitigation work performed within coastal states.

Information transfer forms a vital part of improving overall mitigation success, in developing partnerships and in increasing understanding between transportation professionals and the regulatory community. Several transportation research institutes, DOTs, and the

FHWA maintain websites to disseminate information about current and past research and examples of mitigation approaches for specific transportation projects. The American Public Transportation Association provides a complete website listing of the Educational Institution Transportation program, which includes 54 institutes affiliated with DOTs and colleges and universities throughout the United States. Among the institutes that perform research and information transfer on environmental topics are the Center for Transportation and Environment, which is affiliated with the University of North Carolina and the NCDOT; the Texas Transportation Institute, which is associated with Texas A&M University and the Texas DOT; and the Center for Transportation Studies, affiliated with the University of Minnesota and the Minnesota DOT. The affiliations between state DOTs and transportation research institutions play an important role in information transfer between researchers and practitioners. However, survey results indicate that further improvement is needed in communication between transportation agencies and research groups to increase the level of awareness of information sources among DOT staff.

INTRODUCTION

BACKGROUND

Since the early 1970s, with the passage of statutes such as the National Environmental Policy Act (NEPA), the Endangered Species Act (ESA) of 1973, the Clean Water Act (CWA) of 1972, and the issuance of the U.S. Army Corps of Engineers (USACE)/Environmental Protection Agency (USEPA) Memorandum of Agreement (MOA) on mitigation in 1990, transportation agencies have been responsible for identifying, designing, funding, and monitoring ecological mitigation activities as part of highway projects. Efforts to mitigate impacts to natural habitats have improved over time as knowledge has expanded, as well as through research and innovation. Mitigation efforts have also reflected regional concerns and opportunities. The objective of the synthesis is to provide an overview of transportation agency practices, recent literature findings, and research in progress addressing ecological mitigation.

For the purposes of this report, the term “ecological impact mitigation” defines efforts to offset the loss or impairment of functions and values of natural habitats due to department of transportation (DOT) activities, and envelopes a range of activities pursued or considered by DOTs. This synthesis report presents information about current practices regarding environmental impact mitigation measures and monitoring and evaluation information for aquatic environments and related habitats, including wetlands, streams, and riparian corridors.

PROBLEM STATEMENT AND SYNTHESIS OBJECTIVES

There is at present a lack of consistent information on the implementation and results of ecological mitigation efforts performed by DOTs. The national knowledge base of ecological impact and mitigation assessment is fragmented and inconsistent. Because of variations in regulatory frameworks and environmental conditions throughout the nation, transportation and regulatory agencies have taken different approaches and applied different protocols to mitigate ecological impacts. Therefore, there is a need to synthesize this information and increase its availability to transportation professionals to assist DOTs in reviewing and improving approaches to addressing ecological mitigation issues.

An objective of this study is to document the current practices of transportation agencies as they implement

ecological mitigation measures for highway projects as they apply to aquatic, wetland, and riparian habitats. This synthesis will summarize available information on the types of ecological impacts incurred by highway projects and the methodologies used to assess these impacts, procedures for determining the need for mitigation and monitoring, types of mitigation implemented for different impacts and how mitigated sites are monitored, methodologies for the evaluation of mitigation success or failure, and the costs of mitigation.

SYNTHESIS APPROACH

An important component of this project was a survey of transportation and environmental professionals to determine their experiences with the ecological mitigation process. Questionnaires were sent to transportation agencies in all 50 states and the District of Columbia. The questionnaire addressed many aspects of the ecological mitigation process, ranging from the initial ecological impact assessment phase to the evaluation of mitigation success. A follow-up survey was undertaken to gather additional information not addressed in the first survey. Also, select telephone interviews were performed as needed to collect additional information for case studies and discuss issues not fully addressed in the questionnaire. Twenty-seven transportation agencies representing every region of the nation provided responses to the initial survey. The responses range from detailed synopses of current practices to brief and nonspecific answers. Ten transportation agencies responded to the subsequent follow-up survey.

The information obtained from the surveys and phone interviews was combined with a review of applicable literature and ongoing research on the subject of ecological mitigation to address current practices across the nation.

KEY TERM DEFINITIONS

The following definitions of key terms are derived primarily from the FHWA final rule on *Mitigation of Impacts to Wetlands and Natural Habitats* (23 CFR Part 777).

Compensatory mitigation—Restoration, enhancement, creation, and, under exceptional circumstances, preservation of wetlands, wetland buffer areas, and other natural habitats carried out to replace or compensate for the loss of

wetlands or natural habitat area or functional capacity resulting from federal-aid projects funded pursuant to provisions of Title 23, U.S. Code, or projects funded solely by state programs. Compensatory mitigation usually occurs in advance of or concurrent with the impacts to be mitigated, but may occur after such impacts in special circumstances.

Consolidated mitigation—Compensatory mitigation that is performed at one location with the purpose of mitigating impacts from multiple projects.

Ecological mitigation—Efforts to offset the loss or impairment of functions of natural habitats due to DOT activities; envelops a range of activities pursued or considered by DOTs.

Environmental initiatives—Process adopted by some state DOTs to encourage environmental stewardship among staff and to support the proactive consideration and implementation of environmental enhancements into transportation construction and maintenance projects beyond mitigation measures required by regulatory agencies.

In-lieu fee—Payment or contribution to a natural resource management entity for implementation of either specific or general wetland or other aquatic resource development projects that do not typically provide compensatory mitigation in advance of project impacts.

Mitigation bank—Site where wetlands and/or other aquatic resources or natural habitats are restored, created, enhanced, or, in exceptional circumstances, preserved expressly for the purpose of providing compensatory mitigation in advance of authorized impacts to similar resources. For the purposes of the CWA, Section 404 (33 U.S.C. 1344), use of a mitigation bank can only be authorized when impacts are unavoidable.

Natural habitat—Complex of natural, primarily native or indigenous vegetation, not currently subject to cultivation or artificial landscaping, a primary purpose of which is to provide habitat for wildlife, either terrestrial or aquatic. For the purposes of this report, habitat has the same meaning as natural habitat. This definition excludes rights-of-way that are acquired with federal transportation funds specifically for highway purposes.

Net gain of wetlands—Wetland resource conservation and management principle under which, over the long term, unavoidable losses of wetlands area or functional capacity due to highway projects are offset by gains at a ratio greater than 1:1, through restoration, enhancement, preservation, or creation of wetlands or associated areas critical to the protection or conservation of wetland functions. This definition specifically excludes natural habitat, as defined in this section, other than wetlands.

On-site, in-kind mitigation—Compensatory mitigation that replaces wetlands or natural habitat area or functions lost as a result of a highway project with the same or similar wetland or habitat type and functions adjacent or contiguous to the site of the impact.

Performance standards or criteria—Observable or measurable attributes that are used to determine whether a compensatory mitigation project meets its objectives (Streever 1999).

Practicable—Available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes.

Service area of a mitigation bank—Service area of a wetland or natural habitat mitigation bank shall be consistent with that in the *Federal Guidance for the Establishment, Use and Operation of Mitigation Banks* (60 FR 58605, November 28, 1995); that is, the designated area (e.g., watershed or county) wherein a bank can be expected to provide appropriate compensation for impacts to wetlands and/or other aquatic or natural habitat resources.

Stream or riparian restoration—Returning a degraded stream or stream corridor to the highest level of stream potential available for the surrounding landform. This includes reestablishment of a stream channel that maintains its dimension, pattern, and profile such that over time it does not aggrade or degrade.

Wetland or habitat enhancement—Activities conducted in existing wetlands or other natural habitat to achieve specific management objectives or provide conditions that previously did not exist and which increase one or more ecosystem functions. Enhancement may involve trade-offs between the resource structure, function, and values; a positive change in one may result in negative effects to other functions. Examples of activities that may be carried out to enhance wetlands or natural habitats include, but are not limited to, alteration of hydrologic regime, vegetation management, erosion control, fencing, integrated pest management and control, and fertilization.

Wetland or habitat establishment period—Period of time agreed to by the FHWA, state DOT, USACE, and other regulatory agencies as necessary to establish wetland or natural habitat functional capacity in a compensatory mitigation project sufficient to compensate wetlands or habitat losses due to impacts of federal-aid highway projects. The establishment period may vary depending on the specific wetland or habitat type being developed. This period, provided through DOT contracting methods for wetland or habitat construction, is for one growing season, to cover the successful establishment of installed vegetation. Regulatory agencies typically call for an establishment period for the project of 3 to 10 years, depending

on the habitat type being mitigated or the complexity of the design.

Wetland or habitat functional capacity—Ability of a wetland or natural habitat to perform natural functions, such as providing wildlife habitat, supporting biodiversity, storing surface water, or performing biogeochemical transformations, as determined by a scientific functional assessment. Natural functions of wetlands include, but are not limited to, those listed by the USACE at 33 CFR 320.4(b)(2) (i) through (viii). Wetlands serve significant natural biological functions, including food chain production, general habitat and nesting, spawning, and rearing and resting sites for aquatic or land species; serve as important sites for the study of the aquatic environment or as sanctuaries or refuges; serve to maintain natural drainage characteristics, sedimentation patterns, salinity distribution, flushing characteristics, current patterns, or other environmental characteristics; are significant in shielding other areas from wave action, erosion, or storm damage; serve as valuable storage areas for storm- and floodwaters; serve as groundwater discharge areas that maintain minimum baseflows important to aquatic resources and those that are prime natural recharge areas; serve significant water purification functions; are unique in nature or scarce in quantity to the region or local area; are groundwater discharge areas that maintain minimum baseflows important to aquatic resources and those that are prime natural recharge areas; serve significant water purification functions; and are unique in nature or scarce in quantity to the region or local area.

Wetland or habitat mitigation credit—A unit of wetlands or habitat mitigation, defined either by area or a measure of functional capacity through application of scientific functional assessment. With respect to mitigation banks, this definition means the same as that in the *Federal Guidance for the Establishment, Use and Operation of Mitigation Banks*.

Wetland or habitat preservation—Protection of ecologically important wetlands, other aquatic resources, or other

natural habitats in perpetuity through the implementation of appropriate legal and physical mechanisms. Preservation of wetlands for compensatory mitigation purposes may include protection of upland areas adjacent to wetlands as necessary to ensure protection and/or enhancement of the aquatic ecosystem.

Wetland or habitat restoration—Reestablishment of wetlands or natural habitat on a site where they formerly existed or exist in a substantially degraded state.

Wetland or wetlands—Areas that are inundated or saturated by surface or groundwater at a frequency and duration to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

REPORT ORGANIZATION

The report is organized into nine chapters. Chapter 2 provides the regulatory framework for ecological mitigation. Chapter 3 presents the types of impacts and the ecological impact assessment tools used by transportation agencies. Chapter 4 presents a discussion on when mitigation is provided, the type of mitigation used, and monitoring requirements and methods used to evaluate mitigation success. Chapter 5 discusses the cost of mitigation activities. Chapter 6 presents three case studies of on-going ecological mitigation activities. Chapter 7 discusses the inconsistency of assessment methods and decision making due to the lack of a standard ecological assessment methodology, the application of regulations, and approval of mitigation strategies. Chapter 8 discusses the need for information transfer exchange and possible mechanisms that could be devised to meet this need. Chapter 9 provides a summary of the findings. Lastly, Appendix A includes a copy of the questionnaire, Appendix B contains a list of respondents, and Appendix C provides examples of environmental documents referenced within this report.

CHAPTER TWO

REGULATORY FRAMEWORK

Ecological mitigation has been and will continue to be performed by transportation agencies in compliance with federal, state, and tribal regulatory requirements. In the past decade, there has been a trend by DOTs to undertake ecological mitigation as part of broader initiatives supported through cooperative agreements between the DOTs, state regulatory and natural resource agencies, tribal agencies, and the FHWA and other federal agencies. Some of these initiatives have received funding through the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) and more recently the Transportation Equity Act for the 21st Century (TEA-21), as well as other, non-federal sources.

ENVIRONMENTAL REGULATIONS

DOTs are bound by the regulatory requirements of the NEPA; the CWA of 1972, as amended; the ESA of 1973, as amended; and various state and tribal regulations governing water quality and habitats. Compliance with the CWA and ESA form the basis for most of the ecological mitigation projects performed by DOTs.

Under Section 10 of the Rivers and Harbors Act and Sections 404 and 401 of the CWA, impacts to waters of the United States, including wetlands, are addressed through a permit process administered by 37 regulatory districts and 11 divisions of the USACE. States also regulate impacts to waters through the Section 401 Water Quality Certification process, as well as other state programs. Michigan and New Jersey have assumed USACE jurisdiction for freshwater wetlands and the Section 404 regulatory program, whereas other states have established a joint permitting process with the Corps. Many states also have comprehensive wetland regulations.

Transportation projects that result in impacts to waters of the United States require some form of compensatory mitigation to satisfy permit conditions. In addition, Executive Order 11990—Protection of Wetlands—directs federal agencies to minimize impacts to wetlands resulting from their actions. For example, state DOT projects funded in whole or in part with federal funds must comply with Executive Order 11990, as do non-federally funded projects requiring a USACE permit.

Effective June 5, 2000, the Section 404 permit program was modified with the issuance of five new Nationwide Permits (NWP) and six modified NWP. The changes in

the NWP program are aimed at increasing protection for the aquatic environment and authorizing activities that will result in minimal adverse effects on the aquatic environment. An important revision to the NWP program included the establishment of a uniform impact threshold for impacts to waters of the United States, including wetlands, to a maximum area of one-half to one-third acre NWP. Other revisions to the program reflect concerns for protecting fishery resources, maintaining water quality, and requiring compensatory mitigation at a minimum ratio of 1:1 for all wetland impacts authorized by a NWP. For several NWP, the delineation of affected special aquatic sites may include additional items such as riffle and pool complexes on affected streams, again drawing attention to the increased concern for aquatic habitats, not just wetlands.

The modified General Condition 19 for NWP will allow for greater flexibility in determining mitigation strategies, especially for projects with minor impacts. Based on the language of General Condition 19, it is clear that the USACE has flexibility in determining appropriate mitigation on a case-by-case basis, and that the mitigation activities should be based on what is best for the aquatic environment and what is practicable for the applicant. Given that districts have some flexibility in considering appropriate mitigation strategies to minimize adverse impacts to waters of the United States, DOTs will have the opportunity to present mitigation scenarios to the districts that meet the intent of the NWP program and that are appropriate, practicable, and improve the aquatic environment.

Restoring vegetated buffers along watercourses is one such alternative mitigation method that may provide up to 33 percent of the required mitigation acreage and may find wider acceptance within USACE districts. The USACE, in its notice regarding revision of the NWP program (64 FR 39252, July 21, 1999), stated: "The establishment and maintenance of vegetated buffers adjacent to open waters and streams will protect, restore, and enhance water quality and aquatic habitat. Vegetated buffers can be used to provide out-of-kind compensatory mitigation for wetland impacts where the District Engineer determines that such mitigation for wetland impacts is the best, ecologically, for the aquatic environment." This approach is consistent with watershed management concepts in wetlands and aquatic resource protection and conservation being advanced by the administration (*Protecting America's Wetlands: A Fair, Flexible, and Effective Approach*, White House Office for Environmental Policy 1993) and many state resource agencies.

The USACE released its most recent Regulatory Guidance Letter (RGL), No. 01-1, on October 31, 2001, to provide USACE districts with guidance for the establishment and maintenance of compensatory mitigation projects authorized under Section 404 of the CWA and Section 10 of the Rivers and Harbors Act of 1899. The RGL adopts 10 operational guidelines to improve the ecological success of wetland mitigation identified by the National Research Council (NRC) as part of their recent assessment of compensatory wetland mitigation under the Section 404 program (National Research Council 2001). The overall goal of the RGL is to improve consistency in mitigating impacts to the aquatic environment, enhance permit conditions and enforcement of mitigation activities, and adopt a watershed/holistic approach to mitigation. The RGL adopts the use of the terms “credit” and “debit” with the intent of allowing districts to define approved methods for defining an assessment methodology (functional analysis method, acre-for-acre ratio, etc.) to assign debits and credits according to amount, type, and location. The RGL also recognizes the need to adopt a holistic view toward mitigation that considers all of the mitigation features that add to the aquatic resource and the location of the project within the watershed.

The National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS) have responsibility for the protection of threatened and endangered marine and non-marine species, respectively, under federal ESA regulations. A Biological Assessment is the basis for consultation with the USFWS and NMFS pursuant to Section 7 of the ESA. DOTs review potential impacts to federally listed threatened and endangered species with these agencies, along with respective state and tribal agencies, through the Section 7 consultation process. The USFWS and NMFS issue Biological Opinions based on the Biological Assessment prepared by the DOT for projects that may affect, or are likely to adversely affect, federally listed threatened and endangered species. Mitigation of potential impacts is also addressed as part of the Biological Assessment and it is often required for federal agencies to issue a biological opinion that reaches a finding of no-jeopardy for the subject species. The USFWS and NMFS also develop recovery plans in conjunction with state agencies and local and tribal governments to identify methods to protect and increase populations of threatened and endangered species. In the Pacific Northwest, the NMFS and state DOTs have been involved in numerous projects in an effort to assist in the recovery of Pacific salmon and steelhead. DOTs in California, Idaho, Oregon, and Washington, along with tribal and local governments and organizations, have been working closely with the NMFS to address the concerns expressed in the recovery plans for fish species within the Pacific Northwest, including the salmon and steelhead fisheries. Projects have included efforts to retrofit culverts that block fish passage, revisions to roadside maintenance

operations to improve water quality and minimize vegetation and habitat disturbance, and land management activities to exclude grazing along stream corridors.

The majority of the survey respondents identified Section 404 and Section 401 programs as the primary regulatory requirements for ecological mitigation of transportation projects. Respondents also identified compliance with ESA and state regulations as additional regulatory requirements for project-specific compensatory mitigation. Table 1 summarizes the survey responses.

Nonregulatory issues identified by DOTs that influence ecological mitigation efforts include departmental policies, MOAs with state agencies, FHWA guidelines, and public input.

TABLE 1
REGULATIONS THAT DRIVE ECOLOGICAL MITIGATION
REQUIREMENTS IDENTIFIED BY DOTs

No. of DOTs	CWA		ESA	NEPA Process	State Regulations
	Section 404	Section 401			
	23	3	12	3	15

Notes: CWA = Clean Water Act; ESA = Endangered Species Act; NEPA = National Environmental Policy Act.

ISTEA AND TEA-21

ISTEA broadened the horizons for DOT planning by incorporating the concept of “ecosystem approach” into transportation planning. The ecosystem approach is defined as “a method for sustaining or restoring natural systems and their functions and values” (Garrett and Bank 1995). The ecosystem approach recognizes that cumulative actions of transportation projects have effects within geographic limits based on ecological boundaries. It serves as a means of incorporating ecosystem management concepts into the transportation planning process. The outcome of this approach has been the integration of the NEPA and Section 404 process, increased interagency cooperation and early review of large-scale projects, and, more recently, FHWA and DOT partnerships with other federal and state agencies in watershed planning initiatives. Section 1309 of TEA-21 promotes environmental streamlining within federal regulatory agencies. This has allowed DOTs to establish MOAs with federal and state regulatory agencies to fund staff positions within these agencies to provide early coordination and review of transportation projects.

CLEAN WATER ACTION PLAN (CWAP) OF 1998

The CWAP was developed with the objective of improving the nation’s water resources through a broad program that

involves over 100 separate actions by federal agencies. A major component of the plan is the reversal of a long-term trend of wetland loss within the United States and achieving a net increase in wetlands by 100,000 acres by 2005. The plan includes many different approaches and programs led by federal agencies with the goal of improving all aspects of wetland regulation and mitigation. As a partner in the CWAP, the FHWA has a commitment to attain a 50 percent increase in wetland acreage in 10 years through the Federal-Aid Highway Program (Bank and Garrett 2001), and provide funding for the remediation of wetland impacts stemming from past federal-aid highway construction. The FHWA has established a performance measure within its Performance Plan of 1.5 acres of wetland mitigation for every acre lost from a federal-aid transportation project.

ENVIRONMENTAL INITIATIVES

Environmental initiatives have been included in transportation projects as a way to enhance the local environment and supplement mitigation. Environmental initiatives refer to environmental enhancements and betterments that are incorporated into transportation projects, but are not directly required through permitting activities. Programs that incorporate environmental initiatives have been adopted by several state DOTs. The New York State DOT (NYSDOT) was one of the first transportation agencies to adopt a formal policy—*Environmental Initiative Guidelines and Procedures* (NYSDOT 1999)—directing DOT staff to work with local communities to identify environmental initiatives and mitigation actions and incorporate these activities into transportation projects. NYSDOT has performed numerous projects under this program, including increasing groundwater recharge to supplement base flows within a trout stream, retrofitting a culvert to improve fish passage, stream restoration, and wildlife habitat improvement along rights-of-way.

Other DOTs have taken similar approaches to involve DOT staff and local communities in identifying and incorporating environmental initiatives into project planning. The Oregon DOT (ODOT) also adopted an “Environmental Guidance Statement” that provides direction to ODOT staff to exercise sound environmental stewardship principles and best management practices. The guidance also encourages ODOT staff to identify and evaluate opportunities for environmental enhancements within projects. The California DOT (Caltrans), Florida DOT (FDOT), Vermont Agency of Transportation (VTRANS), and many other DOTs, have departmental policies, missions, visions, and goal statements that include commitments to protect the environment and implement good environmental stewardship.

AASHTO recently initiated the Transportation Environmental Stewardship Pilot Program to assist DOTs in

developing and implementing environmental stewardship efforts. This program also provides a means for disseminating information from DOTs on successful projects. The overall goal of the program is to “make a positive contribution to the environment; establish, through documentation of environmental stewardship activities and results, a credible track record of state transportation agencies’ performance as environmental stewards; and build a reputation for state transportation agencies as ‘part of the solution’ rather than ‘part of the problem’.”

In December of 2000, the U.S. DOT, FHWA, issued a final rule titled *Mitigation of Impacts to Wetlands and Natural Habitats* (23 CFR Part 777), that consolidates the FHWA’s earlier position regarding the use of Title 23, U.S. Code funding for mitigation projects. Under this revised regulation, greater flexibility has been extended to the FHWA and state DOTs for planning and implementing mitigation projects to offset impacts to wetlands and natural habitats caused by highway projects that receive federal funding.

The rule also clarifies the use of federal funds by DOTs as part of ecological mitigation activities. Previously, there was some resistance to the use of federal funds that involved DOT contributions to state-sponsored conservation programs for mitigation projects. The rule clarifies the point that the regulations do not restrict the use of federal funds from in-lieu fee programs or outright contributions to state agencies involved in conservation activities provided that the activity is conducted in accordance with applicable federal law.

A project undertaken or funded by transportation agencies in which the agency has the lead role makes it incumbent upon that agency to ensure successful mitigation. This often means a long-term commitment to monitor and maintain the mitigation for the project. Although cost sharing for mitigation monitoring and maintenance activities during the establishment phase of a mitigation project is eligible for federal-aid participation, long-term maintenance costs are not eligible for federal-aid highway funds [23 U.S.C. 116(a)]. For innovative or unproven mitigation approaches, this can be a significant consideration for DOTs, because regulatory agencies will most likely require an extended period of monitoring and maintenance that will extend beyond the establishment phase. The additional unsupported costs to a DOT may discourage the use of innovative designs.

PARTNERSHIPS AND COOPERATIVE INTERAGENCY INITIATIVES

ISTEA and TEA-21 have fostered interagency cooperation between DOTs and the regulatory community by providing funds to create opportunities for environmental streamlining. Through Section 1309 of TEA-21 some DOTs have

established MOAs with federal and state regulatory agencies to fund staff positions within these agencies. This has allowed these agencies to streamline the environmental review process using dedicated staff to provide early coordination on transportation projects, process permit applications, and review mitigation proposals. In July of 1999, the Department of the Interior signed a Memorandum of Understanding (MOU) with the USDOT establishing an agreement to implement long-term environmental streamlining procedures. By June of 2000, the USFWS developed draft guidance to streamline the programmatic Section 7 consultation process for transportation projects. The USFWS has also established 13 agreements with state DOTs to fund 14 positions within USFWS offices to provide staff to assist with early coordination on transportation projects (USFWS 2000).

Several transportation agencies, including the Michigan DOT (MDOT), Montana DOT (MDT), North Carolina DOT (NCDOT), and Pennsylvania DOT (PennDOT), have developed MOUs with state resource agencies and other partners to identify opportunities for ecological mitigation, including wetland mitigation and stream restoration. These partnerships serve to direct mitigation activities to locations where they are needed and can serve a broader function of addressing water quality or habitat needs within a watershed while satisfying regulatory requirements. The MOUs directly address issues to increase flexibility in the mitigation process, such as the development of partnerships between DOTs and other agencies to locate mitigation sites, the establishment and use of in-lieu fee programs, wetland mitigation banking, and consolidation of mitigation.

CHAPTER THREE

ECOLOGICAL IMPACT ASSESSMENT

TYPES OF IMPACTS

Transportation agencies engage in a variety of activities that can affect the natural environment. These activities may include adverse impacts to natural habitats, including streams and wetlands. Ecological mitigation may be performed by DOTs to offset impacts identified during the NEPA and permit processes.

For highway projects, direct impacts typically result in the loss of a specific unit area of a particular habitat through land clearing and grading activities as part of the construction of new or widened roadways, drainage structures, and attendant features. Aquatic habitats can be affected through physical changes to the stream channel, streambed, and riparian vegetation; the placement of outfalls or culverts within the stream channel; shading from bridges; and changes to existing water quality and quantity because of an increase in impervious surfaces.

Indirect impacts typically occur to areas outside the footprint of the construction activity. Indirect impacts are not always visible and may occur over a larger scale. The linear nature of highways creates situations where the roadway can interfere with wildlife movement corridors or reduce the value of wildlife habitat through habitat fragmentation.

Respondents identified a variety of project types that have been assessed for ecological impacts. The projects generally fall into four categories: new roadway construction, upgrading existing roadways (widening, straightening, intersection improvements, and capacity improvements), drainage improvements (culvert replacements, extensions, and ditch maintenance), and bridge work (replacement, reconstruction, widening, and seismic retrofits). The types of impacts to wetlands identified by DOTs include activities associated with filling, excavation, and mechanical clearing of wetlands. Indirect impacts to wetlands include erosion, siltation, and changes to water quality.

Specific impacts to streams and stream corridors were also identified. Direct impacts include channel and streambed alterations, filling, and water quality changes (siltation and turbidity). Several DOTs also identified impacts to fisheries including fish passage (blockage by elevated slip or culvert lining), thermal impacts from the loss of shading, and habitat alteration through the loss of cover and

structure. The West Virginia DOT specifically identified impacts to freshwater mussels and aquatic vegetation as one of the impact criteria that the agency has had to address for their roadway projects.

Fifteen respondents identified habitat alteration, including habitat fragmentation and potential impacts to federal and state listed special status species, as an impact category encountered in highway projects. Of specific concern in the Pacific Northwest are the potential effects of culverts on fish passage for salmonoids covered by ESA regulations. Other habitat impacts noted include habitat fragmentation and disruption of corridors of wildlife movement.

IMPACT ASSESSMENT METHODOLOGIES

Potential ecological impacts to the resources described previously are addressed by DOTs. Nearly all respondents noted that impact assessments addressed direct, temporary, and indirect impacts.

Survey results also identified that DOTs utilize either best professional judgment or qualitative methodology accepted by regulatory agencies to assess ecological impacts. Most of the respondents identified methodologies used to assess impacts to wetlands, although only a few DOTs identified specific methods used to assess impacts to aquatic environments. The different methodologies identified in the survey are discussed here.

BEST PROFESSIONAL JUDGMENT

Eleven respondents reported that they do not use a standardized assessment methodology to address impacts to the aquatic environment, including wetlands. An informal functional assessment is performed through best professional judgment relying on the expertise of staff and consultants to assess wetland functions and values. In situations where a standard methodology is not used, or the standard methodology is not acceptable to regulatory agencies, the majority of respondents noted that impact assessments are coordinated with regulatory and resource agencies. The goal of this approach is to reach a consensus among DOT and regulatory staff on an acceptable method to evaluate functions and impacts or to reach a consensus on "professional judgment."

MINNESOTA ROUTINE ASSESSMENT METHOD (MnRAM)

The MnRAM is a qualitative assessment method developed by the Minnesota Interagency Wetlands Group, which included the Minnesota DOT (MnDOT), for the evaluation of wetland functions. The MnRAM is employed by the MnDOT for the assessment of wetland impacts. The MnRAM assesses 10 wetland functions and related values consisting of vegetative diversity and integrity, hydrologic regime, flood and stormwater storage/attenuation, water quality protection, shoreline protection, groundwater interaction, wildlife habitat, fishery habitat, aesthetics/recreation/education/cultural and science, and commercial uses. The method provides the evaluator with a consistent framework to document observations and conclusions, using best professional judgment, of the primary functions and values of a wetland. The MnRAM produces a ranking of low, moderate, high, or exceptional functional level for each function and related values. The process also calls for the establishment of a Wetland Comparison Domain, which is a geographic area such as a watershed, ecoregion, or political boundary used to define the limit of comparable wetlands.

NEW ENGLAND HIGHWAY METHODOLOGY

The New England Division of the USACE developed the Highway Methodology (USACE 1995) to assess wetland impacts. This methodology is employed by transportation agencies in Connecticut, Rhode Island, Massachusetts, New Hampshire, Vermont, and Maine. It was developed as part of the New England Division's attempt to integrate the Section 404 permit process with the NEPA process for highway projects. The method involves the completion of a worksheet for each wetland area assessed, although it does not produce a score or rank for the wetlands. It does provide for a consistent process by which best professional judgment is used to identify the principal functions and values of a wetland, followed by an assessment of those functions and values. Thirteen possible functions and values are evaluated as part of this process. This method can also be used to evaluate wetland mitigation projects for comparison with impacted wetlands.

WETLAND RAPID ASSESSMENT METHODOLOGY (WRAP)

The FDOT uses the WRAP developed by the South Florida Water Management District (Miller and Gunsalus 1999) to assess potential impacts to wetlands and to develop compensatory mitigation plans. WRAP is a simple, qualitative assessment methodology that uses a rating index in combination with best professional judgment to evaluate six variables of wetland functions. The procedure generates

numeric output for each variable that can be used to evaluate the existing condition of the wetland WRAP and can also be used to evaluate wetland mitigation concept plans and existing mitigation sites. The method was developed to provide consistency and accuracy in the evaluation of wetland functions by the regulatory community. In Florida, its use has been approved by the USACE and is preferred by DOT staff and regulators.

CHARLESTON DISTRICT STANDARD OPERATING PROCEDURE

The Georgia DOT (GDOT) and South Carolina DOT use a simple, qualitative impact assessment and compensatory mitigation methodology developed by the Charleston District of the USACE (USACE 1996). This methodology can be used to assess impacts to both wetlands and streams. It develops a score for the affected habitat based on seven factors (magnitude of impact, dominant effect, duration, existing condition, rarity ranking, lost kind, and preventability of impact) and the type of impact (fill, dredge, drain, clear, etc.). In generating the score, best professional judgment is used to characterize the wetland and the nature of the impacts. The score derived from the analysis serves as the required mitigation credits necessary to achieve the no-net-loss goal. The methodology also includes provisions for assessing a proposed mitigation plan to determine if the plan will attain the required mitigation credits. The methodology was developed to provide a consistent and predictable framework by which impacts and mitigation requirements could be assessed and mitigation plans developed. GDOT indicated that the use of this methodology is required by the USACE and is preferred by federal and state regulatory agencies.

MONTANA WETLAND ASSESSMENT METHOD (MWAM)

The MDT uses the MWAM (Berglund 1999) to evaluate wetland impacts. MWAM was first developed by MDT and the Montana Department of Fish, Wildlife and Parks in 1989, and subsequently revised. MWAM is a semi-quantitative wetland evaluation methodology designed for use on highway projects. The method assesses 12 functions and values of wetlands and assigns a value of low, moderate, or high to each function. The method also provides an overall ranking of the wetland into one of four categories, as well as assigns a numeric rating that can be expressed in terms of functional units (rank times acres).

The use of MWAM is supported by MDT staff and regulators. MWAM was developed with the intention of providing a simple and economical method to assess wetland functions prior to adoption of the Hydrogeomorphic method.

HYDROGEOMORPHIC APPROACH METHODOLOGY (HGM)

The HGM is a wetland evaluation procedure that is based on three attributes of a wetland: landscape position, hydrology, and hydrodynamics (Brinson 1993). In 1997, the USACE, FHWA, Natural Resource Conservation Service, USEPA, and USFWS issued a National Action (62 FR 33607, June 20, 1997) to implement HGM with the intent of improving the accuracy, replicability, and time saved in preparing wetland assessments in support of the Section 404 program. The methodology provides a means for assessing wetland functions and impacts to those functions in a consistent and scientifically sound manner. The use of HGM to assess wetland functions requires the development of regional assessment models for different wetland types, a process that is still underway.

The use of HGM to assess wetland impacts for transportation projects has not been widespread, pending the development of regional models. Most respondents did not identify an example of an impact assessment performed for a specific transportation project. The literature contains numerous articles discussing applications of HGM for assessing the existing function of regional wetland types and reference wetlands. A few papers have been published that describe the use of HGM to either assess wetland impacts not related to transportation projects or as a method to evaluate wetland mitigation.

The FHWA, Western Federal Lands Highway Division, employed the concepts of HGM to an assessment of riparian-wetland impacts and proposed mitigation for the Pioneer Mountains Scenic Byway in Montana (BIO/WEST 1998). An Interagency Review Team determined that riparian-wetland mitigation credits would be based on wetland functions, and that HGM would be used to assess impacts to wetland functions and the net gain in wetland functional capacity provided by proposed compensatory mitigation activities at four riparian-wetland restoration sites. The HGM analysis employed portions of the riverine wetland guidebook (Brinson et al. 1995).

WETLAND EVALUATION TECHNIQUE (WET VERSION 2.0)

The WET was developed in response to a need for a structured method of assessing wetland functions and values that balanced the use of best professional judgment

with more detailed, site-specific studies (Adamus et al. 1987). WET can be used to evaluate 11 functions and values that are assessed for their effectiveness to perform a function based on the physical, chemical, and biological attributes of the wetland; the wetland's opportunity to perform the function to its level of capability; and the wetland's social significance. The evaluator answers a series of questions regarding the wetland system (assessment area), which results in the assignment of a qualitative probability rating of high, moderate, or low for the effectiveness and opportunity to perform a function.

The WET methodology has been employed extensively in the past as a tool to assess wetland impacts associated with transportation projects. Based on the survey responses, the use of WET has declined, possibly in favor of more rapid assessment methods tailored to a particular region. Only one respondent, the Virginia Department of Transportation (VDOT), noted that WET is still used for projects that are either controversial, have large impacts (>25 acres), or involve wetlands of special importance.

AQUATIC HABITATS

Transportation agencies in Georgia, Maine, New Hampshire, North Carolina, and West Virginia indicated that they assess impacts to aquatic habitats and streams using assessment methods that include benthic and fish surveys to characterize the aquatic community, water chemistry analysis to assess water quality conditions, and qualitative characterization of stream morphology. With the exception of the NCDOT, no defined standard methodologies were reportedly being used. The NCDOT uses the *Draft Internal Technical Guide for Stream Work in North Carolina*, developed by the North Carolina Division of Water Quality as a guidance document to delineate stream conditions and assess potential effects.

The Maine DOT suggested that future evaluations will use the state's bioassay criteria that is based on the Index of Biologic Integrity, initially developed as part of a joint program between the Ohio Environmental Protection Agency and USEPA (Karr et al. 1987; Davis et al. 1996). This method has been widely adopted by state resource agencies. One potential drawback is that it is a nonstandard method and that, much like HGM, a regional reference of a least impaired stream must be available for comparison (NRCS 1999).

CHAPTER FOUR

ECOLOGICAL MITIGATION ASSESSMENT

NEED FOR MITIGATION

In general, the initial and subsequent follow-up survey responses reflect a variety of viewpoints and concerns regarding the ecological mitigation process. There was consistency among the transportation agency responses regarding the types of impacts that require mitigation and the regulatory framework within which mitigation is provided. As identified in the survey, DOTs perform mitigation predominantly to satisfy Section 404/401 permit requirements, tribal regulations, state wetland and water quality permits, Section 7 consultation under the ESA, and NEPA Records-of-Decision (RODs).

Regulatory agencies have determined minimum impact thresholds that require compensatory mitigation. Compensatory mitigation requirements for wetlands are typically measured on a per-acre basis. Minimum impact thresholds requiring wetland mitigation reported by DOTs (prior to NWP revisions) range from 0.10 to 0.33 acre. Five DOTs reported that wetland impacts of any size require some form of mitigation. The majority of the respondents (13) indicated that these thresholds were flexible.

Fifteen respondents identified circumstances whereby ecological impacts are not mitigated. These impacts include loss of habitat (upland), buffer zones along streams or wetlands, impacts below mitigation thresholds, fragmentation of habitat, wildlife mortality, wildlife passage, riparian vegetation removal, and loss of ephemeral (intermittent) streams. Eleven DOTs noted that they would mitigate for unregulated impacts if credit toward regulated activities were provided.

TYPES OF MITIGATION

Ecological mitigation can involve a number of activities that provide a net benefit to the target community. Transportation agencies pursue a variety of projects to address mitigation needs. For wetlands these actions can include wetland restoration, creation, enhancement, and preservation. Examples of stream restoration activities can include stream bank restoration and stabilization, instream habitat improvements, establishing/planting riparian buffers, and fencing to exclude grazing.

According to the survey, the method selected by a DOT to mitigate for impacts is guided by regulatory requirements

(replacement ratios), banking instruments, opportunities available in the area, and through negotiations with agencies. Environmental initiatives pursued by some DOTs may also act as a means for mitigating for current or past project impacts. GDOT noted that the Charleston District Standard Operating Procedure provides a standard method for determining mitigation requirements for wetlands based on calculated mitigation credits. The Western Federal Lands Highway Division, working with regulatory agencies, has employed HGM to determine the net gain in wetland functional capacity provided by proposed compensatory mitigation activities. The mitigation approaches reported by DOTs in the survey are listed in Table 2.

TABLE 2
SUMMARY OF MITIGATION MEASURES REPORTED BY DOTs

No. of States	Mitigation Measures
16	Wetland restoration
12	Wetland preservation
15	Wetland creation
6	Wetland avoidance and minimization
8	Mitigation banking
3	In-lieu fee
2	Endangered species relocation/habitat enhancement
3	Habitat improvement
5	Stream restoration

A review of data reported from an earlier survey of DOTs (Hinojos et al. 1999) indicated that 50 percent of the responding DOTs (12) used wetland restoration and enhancement for more than 80 percent of their mitigation needs. The remaining respondents used a varying combination of creation, restoration, enhancement, and preservation. In addition, the preferences reflecting a regional difference with more restoration and enhancement mitigation projects occurred in southern and midwestern states. Through the NCHRP, an ongoing study is being performed, "Guidance for Selecting Compensatory Wetland Mitigation Options" (NCHRP Project 25-16). The findings of Phase I of the research noted that most DOTs are pursuing restoration projects due to fewer design and construction problems and the greater likelihood of success (NCHRP 2001).

The USACE and FHWA have a regulatory obligation to maintain no-net-loss of wetland functions for federally funded highway projects requiring compensatory mitigation

under Section 10/404 permits. The FHWA has also established a policy goal of providing compensatory mitigation at a ratio of 1.5:1 for federal-aid projects. It is typically up to the discretion of a USACE regulatory district to determine how a proposed mitigation strategy will achieve that goal. Although the modification of the NWP Program and General Condition 19 offers the USACE more flexibility in considering mitigation practices for small project impacts, the Corps does not always exercise discretion to allow out-of-kind mitigation. Four DOTs noted that out-of-kind mitigation is essentially not approved by their USACE districts. Other DOTs noted that out-of-kind mitigation is acceptable when opportunities for in-kind mitigation are not available, the replacement mitigation is considered more valuable, and the regulated impacts are minor.

USACE districts and state and tribal regulatory agencies require DOTs in several states including California, Oregon, Washington, Kentucky, Tennessee, North Carolina, Virginia, West Virginia, and Pennsylvania to mitigate for stream impacts by providing specific mitigation in the form of stream restoration activities, whereas other DOTs do not face such regulatory requirements. DOTs in Maryland, New York, North Carolina, and Virginia have initiated programs that provide funding and support for stream restoration projects either through environmental initiative programs or by establishing MOAs with state resource agencies to provide funding to those agencies to perform the work.

The NCHRP study on Wetland Mitigation Options (Project 25-16) has noted that several DOTs do not have access to mitigation banks because of regulatory obstacles stemming from interagency disagreements on the use of banks posed by USACE districts. Fewer DOTs noted physiographic constraints related to watershed/service area size and the lack of need for a bank (NCHRP 2001).

MITIGATION SUCCESS

All of the respondents noted that the goals and objectives of mitigation activities are typically established through the permitting process in consultation with regulatory agencies. The success of a mitigation project is determined by how well the mitigation achieved the goals and objectives. The goals and objectives of a mitigation project are usually translated into performance standards that become a part of the permit conditions. In the document, *Examples of Performance Standards for Wetland Creation and Restoration in Section 404 Permits and an Approach to Developing Performance Standards* (Streever 1999), performance standards are defined as “observable or measurable attributes that can be used to determine if a compensatory mitigation project meets its objectives.”

Performance standards are developed specifically for the type of mitigation pursued, either by DOT staff in consultation with regulatory agencies, or are specified within regulatory guidance and permits. Performance standards reported by DOTs most commonly include estimates of percent cover and evidence of wetland hydrology. The New Hampshire DOT also assesses wetland functions and values in accordance with the Highway Methodology (USACE 1995). The Washington State DOT has developed a guidance document for identifying and selecting success standards for wetland mitigation projects (Ossinger 1999). The document recognizes that the uniqueness of a project will require the selection of specific performance objectives and success criteria. The guidelines provide a series of Tier 1 (general) and Tier 2 (site-specific) success standards that can be modified to fit the particular mitigation site, and also discusses “how to” write success standards.

Performance standards for stream restoration projects include evidence of riparian vegetation survival, bank stabilization, evidence of channel stability, fish population estimates within restored stream reach, and macroinvertebrate surveys. For endangered species, performance standards are developed on a case-by-case basis. These criteria typically require more detailed assessments of the habitat type and structure and surveys for the specific species of wildlife or plant.

Recent evaluations of the performance of past DOT mitigation efforts have been published. The FHWA examined the performance of four successful wetland mitigation projects that were initially established in the 1980s and early 1990s (FHWA 2000). Although problems were identified within various stages of each mitigation project, all were judged to be successful in achieving design goals.

The NCDOT has funded a two-phase evaluation of 49 NCDOT compensatory mitigation sites and 11 reference sites throughout the state. When divided into separate mitigation types (preservation, restoration, and creation), a total of 71 compensatory mitigation areas were evaluated. The first phase of the study indicated that the ecological success of a mitigation site was dependent upon the successful establishment of natural geomorphology (Brinson and Rheinhardt 2000). The most successful mitigation sites were ones where fill material had been removed from a wetland area, whereas creation sites were generally the least successful due to the planting within subsoil or soils with degraded A-horizons. Of the 71 compensatory mitigation areas evaluated, 26 were found to be ecologically successful, 19 are preservation sites and automatically considered successful, 9 were found to be unsuccessful, and the remainder could not be evaluated at the time of the study for various reasons. The report provides a detailed

assessment of each site and the apparent reasons for success or failure.

Although not specific to transportation-related mitigation projects, the NRC completed an assessment of the compensatory wetland mitigation actions performed under the CWA (NRC 2001). The findings of the NRC Committee on Mitigating Wetland Losses noted that despite the progress made over the past 20 years, wetland mitigation performed under the CWA is not attaining the no-net-loss goal. The NRC report presents the following five conclusions with supporting recommendations that have already been implemented in part by the USACE and will affect future mitigation action by DOTs:

- To improve the tracking of permit and mitigation decisions,
- View mitigation from a watershed approach to improve permit decision making,
- Improve compliance with mitigation requirements through the use of functional assessment tools and adoption of performance standards,
- Provide additional support for regulatory decision making, and
- Improve on the use of third-party compensation approaches/programs.

MONITORING METHODS

Monitoring methods vary greatly in terms of the level of detail and the frequency of monitoring. The purpose of monitoring is to determine if mitigation is achieving its performance standards or if intervention is required to address a particular problem. Most DOTs noted that they do not follow a standard monitoring procedure.

Caltrans follows the three USACE district's "Habitat Mitigation and Monitoring Proposal Guidelines" (USACE 1996), which were assembled to assist applicants in developing mitigation plans and monitoring programs allowed through Corps permits. The guidelines include a detailed outline of reporting requirements that address issues such as target functions and values, target hydrologic regime, target acreage, performance criteria, monitoring methods, reporting schedule, and contingency measures. The guidelines remain flexible by allowing the applicant to specify the methods used to collect the required data. The guidelines also allow the applicant to develop the success criteria subject to USACE review and approval, with a provision that final success will not be considered met until the mitigation plantings survive a minimum of 3 years after human intervention has ceased. In addition, the performance criteria emphasize that the presence of a high amount of non-native vegetation will require corrective action prior to final acceptance.

CHAPTER FIVE

COSTS

This chapter discusses the financial and other costs required to achieve mitigation success, both in the implementation and monitoring phases of a mitigation effort. The cost of a mitigation effort can vary greatly on a per project basis. Cost elements may include property acquisition (right-of-way) or conservation easement establishment, legal fees, permit preparation and application fees, design, plan and specification preparation, construction and material costs, construction monitoring, monitoring during the establishment and management phase, and public involvement. Additional costs may stem from the need for remediation activities identified during the management phase of the project. Each mitigation activity will require different elements and will typically have unique cost features.

A study prepared for the New England Regional Office of the USEPA examined costs for wetland restoration and creation projects in the Northeast (Louis Berger & Associates, Inc., and BSC Group 1997). The effort included a literature survey and a survey of DOTs and other state agencies to gather available information on mitigation costs. Several earlier efforts to estimate wetland mitigation costs were reviewed, including a national survey performed by GDOT in 1993 and 1995. Among the 35 restoration projects and 40 creation projects examined in detail in the USEPA report, the following factors that influence project costs in the Northeast were identified:

- Permitting can be a substantial part of project costs, ranging from 3 to 59 percent of total mitigation activities or road construction work, with a median cost of 13 percent.
- Off-site wetland mitigation can add significant costs for site selection studies.
- Different project goals can affect project costs. The cost for restoration activities that involve restoring tidal influence can be significantly lower than the creation of a freshwater marsh that involves grading.
- Wetland creation that involves structures, site preparation, and earthmoving/excavation adds significant costs to a project; up to 95 percent of construction costs.
- Engineering plans can cost up to \$5,000 per sheet. Small projects can require as many sheets as larger projects, creating an economy of scale.
- Monitoring costs vary according to agency requirements, but typically represent 8 percent of project costs.

- Small projects had higher cost-per-acre ratios than large projects. Mitigation costs were found to be too variable to estimate costs reliably on a per acre basis. Costs per acre of wetland decrease only slightly with an increase in project size.
- Construction cost per unit area tends to be less dependent on project size for creation projects than for restoration projects. The difference is attributed to the need to involve a greater portion of creation sites in construction activities than restoration sites.

The USEPA study concluded that the total mitigation costs ranged from \$4,600 to \$9,690,000, with a median cost of \$239,000. The cost per acre ranged from \$800 to \$1,426,000, with a median of \$54,000.

A comparison of mitigation costs across regions of the country is difficult as well. There is considerable variability in several factors that affect mitigation costs, including greater opportunities for restoration in the southeast that generally has lower implementation costs. An NCHRP *Research Results Digest*, "Guidance for Selecting Compensatory Mitigation Options" (NCHRP 2001), noted that differences in mitigation costs across states and regions vary due to site availability, wetland availability, terrain type, mitigation size, resource manager abilities, design flexibility, and willingness of landowners to sell property or enter into a conservation easement. In western states, the availability of water rights to support a wetland mitigation project can also add to project costs.

When asked to provide cost information for mitigation projects, respondents generally provided implementation costs that reflected their wetland mitigation efforts. The cost of mitigation activities as presented by the respondents (Table 3) is varied and reflects several factors, although land and construction costs are typically the greatest variables.

Likewise, monitoring costs are variable across states and probably reflect the mitigation monitoring requirements of regulatory agencies and the complexity of the mitigation designs. As noted in the USEPA report, wetland-monitoring costs in the Northeast generally ran about 8 percent of the total mitigation project cost.

Several DOTs stated that they are considering or are in the process of developing a detailed database to monitor the status and costs of their mitigation projects. The data-

TABLE 3
SUMMARY OF MITIGATION IMPLEMENTATION AND MONITORING COSTS FOR STATE DOTs

State	Approximate Cost of Implementation	Approximate Cost Of Monitoring
CT		\$50,000/5 years
FL	\$75,000/acre (in-lieu fee)	
GA	\$4,000–6,000/acre \$12,000–24,000/acre for nontidal wetland	\$100–200/acre
IN	\$8,000–56,000/acre (land cost extra)	\$1,800/site/year (staff) \$2,800/site/year (consultant)
LA	\$3,000/acre of wetland impact	
ME	\$70,000–200,000+/acre impacted	Included in implementation cost
MO	\$20,000/acre	\$1,000/acre
MT	\$10,000–15,000/acre	\$365,000/3 years/30 sites
NE	\$4,000–6,000/acre (wetland bank)	\$1,000/site
NJ	\$0–200,000+/acre	
NC	\$10,000/acre (1:1 mitigation bank) \$20,000/acre (at 2:1 ratio)	Included in implementation cost
TX	Recent wetland bank--\$2.3 million	Monitoring, improvements to recent job— \$2.2 million/20 years
WV	1% of project cost	0.5% of project cost
WI	\$10–12 million (wetland mitigation bank) \$3,900/acre (average for 28 bank sites)	<2% of project cost
WY	±\$1,500/site/year	

bases may include name and location of project, type of project, acreage or linear feet, construction status, monitoring status, and costs. Costs may include the elements of design, right-of-way, construction, monitoring, and maintenance. For managed mitigation banks, the databases will also serve to track available mitigation credits in the form of acres, linear feet, and habitat conservation credits for special status species. The databases will reflect the needs of individual DOTs. Future comparisons of mitigation costs between DOTs may be difficult if a standardized accounting system is not adopted. The MDT has been maintaining a database to track the costs of its mitigation projects. Cost items include NEPA evaluation, engineering/design, right(s)-of-way (property) acquisition, acres, and cost per acre. The property costs represent the highest cost item for mitigation projects.

When questioned on funding sources for mitigation activities, DOTs indicated that for federal-aid projects, an 80/20 cost share with federal and state funds was used. State transportation funds were used for mitigation projects on non-federal-aid highway projects.

ISTEA and TEA-21 have provided funds and increased flexibility for DOTs to address mitigation of ecosystem impact requirements. Surface Transportation Program funds, including a 10 percent set-aside from each state's Surface Transportation Program funds for Transportation Enhancements, can provide up to 20 percent of the cost of mitigation efforts associated with facility reconstruction, rehabilitation, resurfacing, or restoration of existing roadways.

The funds can support DOT-sponsored improvements to address environmental impact mitigation and stormwater pollution abatement and treatment. Eligible projects include retrofit or construction of stormwater treatment systems, nonpoint source best management practices, and riparian or wetland restoration projects. Additional project types include culvert retrofits to improve fish passage and installation of wildlife crossings to reduce wildlife mortality and maintain habitat connectivity.

TEA-21 also provides DOTs with funds that can be used to support ecological measures to offset impacts to wetlands and other natural habitats. Mitigation measures may include compensatory measures, such as project-specific wetland impact mitigation, stream restoration, upland and wetland banking, and threatened and endangered species impact mitigation. These funds can also be used by DOTs to provide compensation in the form of contributions to federal- and/or state-sponsored habitat conservation, restoration, and enhancement programs of statewide and regional importance. The Maryland DOT has entered into an agreement with the Maryland Department of Natural Resources (DNR) to provide TEA-21 Transportation Enhancement funding for a 2-year stream restoration program to be managed by the DNR. The stream restoration program has basic requirements such as having a connection to transportation facility, 50 percent match for funding, and local community support.

Nearly all DOTs responding to the survey recognized mitigation costs as part of the cost of "doing business" to

obtain permit approvals. Likewise, most DOTs would prefer to have more options to reduce the complexities and costs of mitigation. Several DOTs noted that “better” mitigation efforts could have been achieved with mitigation funds, but that such funds were not available due to regulatory constraints. Some of the options identified by DOTs

are easier access to wetland mitigation banks, in-lieu fees, consolidated mitigation projects, mitigation credit for combinations of mitigation approaches (restoration, creation, enhancement, and preservation), and compensatory mitigation credit for improving or providing wildlife underpasses/overpasses and fish passage devices.

CHAPTER SIX

CASE STUDIES

Case studies of new or innovative ecological mitigation approaches and strategies have been incorporated to demonstrate the recent efforts of DOTs in this field. The case studies are based on projects identified by questionnaire respondents as recent successful efforts by these agencies to address their mitigation needs. The following three projects represent three different types and sizes of mitigation projects and illustrate the collaborative role of DOT and regulatory staff to mitigate impacts from transportation projects.

**NEW JERSEY DEPARTMENT OF TRANSPORTATION:
ROUTE 206 AND ROUTE 15—ROSS'S CORNER
INTERSECTION IMPROVEMENT PROJECT**

The New Jersey DOT (NJDOT), Office of Project Management, identified Ross's Corner—the intersection of Route 206 and Route 15—as needing additional turning lanes because of existing intersection deficiencies. Although the project area is located within the floodplain of the Paulins Kill River, the NJDOT did not expect it to significantly affect the river or its tributaries. The USFWS raised the issue of potential water quality impacts of the project to the Paulins Kill River, specifically in regards to potential effects on the federally endangered dwarf wedge mussel (*Alasmodonta heterodon*). The fundamental concern stressed by the USFWS was the potential degradation of the river's water quality and aquatic habitat due to an alteration of stormwater discharge.

To comply with an interim no-mixing zone policy established by the USEPA and the state for the Paulins Kill River (i.e., water quality of surface runoff equal to the river's water quality), project designers recommended the installation of an underground stormwater management system composed of two vortex chambers and two infiltration chamber fields. The vortex chambers are particularly effective at treating the "first flush" of runoff that typically carries the bulk of suspended solids from impervious (e.g., paved) surfaces. Typically, most of the heavy metals and pollutants in the runoff adhere to suspended solid fragments; therefore, their removal substantially reduces the concentration of heavy metals and other pollutants in the stormwater runoff. After treatment in the vortex chambers, the water flows into the infiltration chamber fields, allowing runoff to gradually percolate into the ground.

After conducting field studies, the NJDOT prepared design plans and specifications addressing the size, layout,

and installation methods of the vortex chambers and infiltration chamber fields according to the manufacturers recommendations. The implementation of the underground stormwater management system will minimize the project's impacts on the dwarf wedge mussel. The use of new technologies to treat stormwater runoff avoided a lengthy Section 7 consultation process with the USFWS and minimized potential water quality impacts to a federally endangered mussel from an intersection upgrade.

**CALIFORNIA DEPARTMENT OF TRANSPORTATION:
BEACH LAKE MITIGATION BANK**

In 1994, Caltrans signed a formal mitigation banking agreement with several regulatory and resource agencies to use a 142-acre agricultural parcel to create 92 acres of habitat to mitigate for impacts to seasonal and permanent wetland and riparian areas from Caltrans projects within a 14 county area in the Sacramento/San Joaquin Valley. An "Agreement on Mitigation Strategy" was developed that outlines the purpose, guidelines and policies, criteria for using the bank, debit and crediting procedures, and monitoring and management. The project was funded using state monies for seismic retrofit projects and federal funds. The FHWA was a partner in developing the bank and the banking agreement.

The Beach Lake Mitigation Bank is located in Sacramento County and is bounded on the east by Interstate 5, the north by Morrison Creek, the west by the Sacramento River, and the south by Laguna Creek. The Stone Lakes National Wildlife Refuge is to the south.

The purpose of the bank is to provide replacement freshwater wetland and woody riparian habitats for unavoidable impacts to these types of habitats within the ecoregion, defined as the lower Sacramento Valley and upper San Joaquin Valley. In general, habitat losses from projects below the 1,500-ft elevation can be compensated for in the bank in the following counties: Amador, Calaveras, Colusa, El Dorado, Nevada, Placer, Sacramento, San Joaquin, Solano, Stanislaus, Sutter, Tuolumne, Yolo, and Yuba. The bank is to be used primarily to compensate for small losses of wetland habitats, which result from impacts from transportation projects.

The bank has three ponds, two seasonal and one perennial. There are a total of 46 acres of seasonal wetland habitat and 21 acres of perennial wetland habitat. There are

three types of riparian habitat, woody-forested, woody-scrub/shrub, and valley oak woodland, for a total of 25 acres. The different habitat types were chosen to resemble historical wetlands and aquatic habitats of the Sacramento Valley. A pump is used to divert water from the adjacent Lower Beach Lake. Water levels on the site are controlled by a series of water structures that allow for seasonal variation to manage for different types of waterfowl.

Construction of the site cost \$1.4 million. To support the structural components of this site an additional \$400,000 was put into an endowment account for long-term maintenance and management. Personnel from the USFWS Stone Lakes National Wildlife Refuge oversee day-to-day management of the site.

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION: NORTH CAROLINA WETLAND RESTORATION PROGRAM AND FULL DELIVERY CONTRACT MITIGATION BANKS

To comply with federal and state regulations, the North Carolina DOT (NCDOT) is frequently required to apply for environmental permits. In many instances, the NCDOT is required to provide compensatory mitigation for wetland impacts to satisfy permit conditions. Prior to the beginning of highway construction for which wetland mitigation is required, the NCDOT must obtain the necessary permits. As a result of the delays in construction, the NCDOT desired to create wetland mitigation sites in order that future permit applications for highway construction can offer wetland mitigation that is already constructed and has achieved success in advance of the project.

In 1999, NCDOT and the North Carolina Department of Environment and Natural Resources (NCDENR) signed an MOU to assist the NCDENR in protecting and improving water quality in targeted watersheds by restoring wetlands and streams. The restoration projects could also be used by the NCDOT to address future mitigation needs. In the Neuse River Basin alone, the NCDOT estimates that the wetland impacts over the next 5 to 10 years will amount to 200 acres, of which 150 acres are riverine impacts and 50 acres are non-riverine impacts. The MOU calls for the NCDOT to pay \$2.5 million dollars annually to the Wetland Trust Fund over a period of 7 years. In return, the North Carolina Wetland Restoration Program will use these funds to develop local watershed plans in watersheds where future NCDOT projects are expected to significantly impact wetlands and streams. The estimated degree of wetland and stream impacts as a result of future transportation construction is based on the NCDOT's Strategic Wetland Analysis and Mitigation Plan. The NCDOT will use the local watershed mitigation site as a wetland bank and withdraw wetland credits to satisfy federal and state mitigation requirements. In 1998, the NCDENR established

an MOU with the Wilmington District of the USACE that established the guidelines and procedures for in-lieu fee payments into the Wetland Trust Fund to satisfy compensatory mitigation requirement of permitted activities.

In addition to the Wetland Trust Fund, the MOU established the North Carolina Watershed Restoration Policy Committee, which reviews local watershed restoration plans developed by the NCDENR and identifies components of the plan that would satisfy NCDOT mitigation requirements for transportation projects. This committee is comprised of representatives from 11 North Carolina agencies, 6 federal agencies, and other natural resource agencies.

Furthermore, to ensure NCDOT compliance with state and federal regulations regarding wetland mitigation, the NCDOT developed the Full Delivery Project. The Full Delivery Project is designed to supplement the NCDOT in-house staff's effort (i.e., MOU) to provide compensatory mitigation for impacts to wetlands and stream crossings resulting from highway construction by purchasing wetland mitigation and stream restoration from private firms. Through this program, private firms are responsible for the full development of wetland mitigation banks to supply the NCDOT with mitigation credits for riverine and non-riverine wetlands and stream restoration. The NCDOT reimburses the private firm on a per-credit basis for each bank site. The private firm is responsible for locating and assessing the bank site, preparing all relevant studies and designs, negotiating credits and obtaining a banking instrument from the Mitigation Banking Review Team (MBRT), purchasing the property, and constructing and maintaining the bank for a minimum of 5 years. This program was initiated in 1999 and several bank projects have been awarded and are under development and review.

NEW YORK STATE DEPARTMENT OF TRANSPORTATION: ENVIRONMENTAL INITIATIVES PROGRAM

In 1998, the NYSDOT developed and instituted the Environmental Initiative program as a means to pro-actively address transportation-related environmental issues. The program affects all aspects of how the NYSDOT performs its work. The program is described in detail at the NYSDOT's website at <http://www.dot.state.ny.us/eab/envinit.html>. The Environmental Initiative is composed of three approaches: Environmental Benefit Projects that are designed, funded, and implemented by NYSDOT; Environmental Betterment Programs that are funded by local agencies and groups and can be incorporated into DOT construction projects; and the overall strengthening of NYSDOT's environmental performance in a variety of areas including roadway maintenance activities, promotion of air quality improvement strategies, exploration of innovative uses of recycled materials, and increasing efforts to preserve the cultural

and natural heritage of the state. The former two programs directly address ecological mitigation issues and go beyond the typical regulatory compliance that NYSDOT adheres to. One of the goals of the Environmental Initiative is not only to minimize and mitigate impacts but also to take an active role in the protection, enhancement, and restoration of the environment. The NYSDOT works with other agencies and the public to incorporate environmental enhancements into projects and daily operations. The NYSDOT performs the projects because “it’s the right thing to do.” These enhancements usually are at little or no additional cost to projects. To ensure that projects are pro-active, the Environmental Initiative was incorporated into the Engineering Instruction. A copy of the Engineering Instruction is included in Appendix C. The Engineering Instruction steers engineers toward integrating environmental enhancements into projects. The Environmental Initiative has generated a better working relationship between the NYSDOT and environmental agencies, local communities, and non-profit groups resulting in quicker approval of permits, lower mitigation costs, and cost-effective environmental benefits. Because individual projects are developed within each region on a project-specific basis, precise dollar amounts have been difficult for the NYSDOT to track. The NYSDOT estimates that savings have occurred in the form of reduced administrative costs for permitting, reduced punitive cost for mitigation, and reduced time for project development time (McVoy et al. 1999). In addition, the NYSDOT has also noted intangible benefits in the form of improved staff morale and an improved working relationship with other agencies, local governments, and environmental groups.

Funding for these projects has come from several sources. Typically, the projects are incorporated into the transportation project and are eligible for federal-aid cost sharing through the Surface Transportation Program or the National Highway System. Matching state funds (20 percent) are provided through the State Highway Law. A copy of the directive for federal funding eligibility for Environmental Initiatives is included in Appendix C.

Since 1998, the NYSDOT has used the Environmental Initiative to complete numerous projects that resulted in wetlands restoration, water quality improvements, stream restoration, and fisheries habitat improvements. Example projects include the following:

Replacement of Chilloway Bridge Over the Beaverkill River—The Beaverkill River is well known for its fly fishing and an important contributor to the local economy. The NYSDOT partnered with the New York State Department of Environmental Conservation (NYSDEC), the national office of Trout Unlimited, and local fishing organizations and advocates to plant trees and shrubs along the riverbank to improve the riparian habitat and provide shading along the stream as part of the bridge replacement project. A separate project along the Beaverkill and Willowmac watershed was also initiated

Embankment Repair Adjacent to NY Route 39 from Collins to Springville—During the fall of 1999, the NYSDOT consulted with the NYSDEC to address methods to stabilize a road embankment slope along a creek. Both agencies realized the potential the creek had to become a spawning and nursery stream for steelhead. The stream and channel banks were restored, protected, and stabilized and a fish ladder installed so that the steelhead could pass upstream to their spawning habitat.

Habitat Improvement, Lake Ontario State Parkway, Monroe and Orleans Counties—In 2000, the NYSDOT collaborated with the Braddock Bay Raptor Research Center, the NYSDEC, the New York State Office of Parks, The Nature Conservancy, and the Boy Scouts of America to develop and implement a wildlife enhancement plan along the parkway. The plan called for the installation of wildlife plantings and nest boxes for kestrels and wood ducks, as well as improving habitat for wildlife and enhancing parkway aesthetics. The NYSDOT is also assisting in the management of the habitat by performing mowing of grass and thinning of trees.

INCONSISTENCY OF METHODS AND DECISION MAKING

ECOLOGICAL IMPACT AND MITIGATION ASSESSMENT METHODOLOGIES

Nine respondents indicated that there is adequate information available to support their selection of impact assessment methodologies. Eight other respondents noted that they had not found adequate information available regarding impact assessment methodologies, particularly for assessing potential adverse effects to threatened and endangered species and habitat fragmentation.

At present, there are no standardized ecological impact and mitigation assessment methodologies that can be applied nationally. The Hydrogeomorphic Methodology (HGM) has long been touted as the next assessment method to be employed on a national basis. Reference sites for HGM are still being developed and to date this method has not seen widespread use by transportation agencies for assessing wetland functions and impacts. Several DOTs continue to use regional standardized qualitative methods to assess wetland impact mitigation requirements because they are easy to use and are accepted by regulatory agencies. In the absence of standardized methods, other DOTs rely on best professional judgment to assess wetland functions and potential impacts.

APPLICATION OF REGULATIONS

The USACE and the FHWA have a regulatory obligation to maintain the no-net-loss goal of wetland functions for federally funded highway projects requiring compensatory mitigation under CWA Section 10/404 permits. It is typically left up to the discretion of the regulatory district to determine if a proposed mitigation strategy will achieve that goal. Although the modification of the NWP Program

and General Condition 19 offers the USACE more flexibility in considering mitigation practices for small project impacts, the Corps does not always exercise their discretion to allow out-of-kind mitigation for larger impacts. It is apparent from the survey responses that not all DOTs have had the opportunity to use out-of-kind mitigation.

The USACE regulatory districts generally act independently in their approaches to wetland mitigation and mitigation bank establishment. A “one-size-fits-all” method for determining mitigation ratios for projects does not exist, and the approaches are based on regional issues and concerns. For example, the Philadelphia District only provides mitigation credit for wetland preservation in extreme cases, such as when a highly valuable wetland is threatened by pending development, and they accept the use of wetland enhancement to offset only minor impacts to existing degraded wetlands. The district’s preference is for wetland restoration and creation that replaces the wetland acreage. The ratio for enhancement typically exceeds 3:1. The Charleston District has developed a wetland mitigation Standard Operating Procedure that provides up to half of the required mitigation through preservation, and more readily provides credit for wetland enhancement. These differences in wetland mitigation approaches reflect regional concerns and illustrate the different approaches to the no-net-loss policy exercised at the district level.

Recent findings of NCHRP Research Project 25-16 noted that several DOTs do not have access to mitigation banks due to regulatory obstacles posed by USACE districts (NCHRP 2001).

As noted previously, USACE districts can operate independently and not all districts accept the same types of mitigation to satisfy compensatory mitigation requirements.

CHAPTER EIGHT

INFORMATION TRANSFER

Information transfer forms a vital part of improving overall mitigation success, in developing partnerships, and in increasing understanding between transportation professionals and the regulatory community. Information regarding the technical aspects of ecological mitigation is readily available from scientific journals, periodicals, regulatory agency publications, and a variety of Internet sites. Information specific to ecological mitigation projects for transportation agencies is also readily available from a number of Internet sites maintained by research institutes and university transportation centers sponsored by USDOT.

The American Public Transportation Association provides a complete website listing of the Educational Institution Transportation program that includes 54 institutes affiliated with DOTs and colleges and universities throughout the United States. One example is VDOT's long-standing relationship with the Virginia Transportation Research Council (VTRC) and the University of Virginia. The VTRC provides VDOT with resources for applied research, consulting, and technology transfer and training in transportation. Many DOTs have similar relationships with state universities and affiliated transportation research institutes, but not all transportation institutes perform research on environmental issues. A few of the institutes that perform research and information transfer on environmental topics include the Center for Transportation and Environment (CTE), which is affiliated with the University of North Carolina and NCDOT; the Texas Transportation Institute, which is associated with Texas A&M University and the Texas DOT; and the Center for Transportation Studies, which is affiliated with the University of Minnesota and MnDOT. The affiliations between DOTs and transportation research institutions play an important role in information transfer between researchers and practitioners.

Several of the information sources and their services are highlighted here.

Federal Highway Administration

<http://www.fhwa.dot.gov>

Provides information exchange on transportation and the natural environment topics, policy statements, upcoming conferences, technical training, and events and links to related websites.

U.S. Department of Transportation

<http://www.dot.gov/>

Provides information on transportation topics, links to other sites, reports and publications, and library resources.

The Center for Transportation and the Environment

<http://itre.ncsu.edu/itre/cte/>

Provides information on regional and national environmentally related transportation problems; conducts database searches, prepares literature reviews, designs and conducts nationwide surveys, and tracks environmental research in progress; contains recent literature addressing wetlands and water quality issues, transportation control measures, wildlife fragmentation and mortality, and other environmental subjects; provides a forum through which transportation and environmental professionals can discuss current policy issues, research and technology innovations, and best practices; supplies links to publications from conferences, seminars, and other sources; and provides links to other sites. CTE provides a current awareness service for DOT and FHWA staff that provides registered users with announcements of new literature on transportation and environmental topics. CTE also operates TRANSENVIRO, a moderated electronic discussion group that provides an informal network for discussions about transportation-related research, problems and solutions, requests for advice and assistance, teleconferences, the International Conference on Ecology and Transportation, and conference announcements.

Transportation Research Board

<http://www.nationalacademies.org/trb/>

Provides information on current transportation research projects, publications on research findings, addresses all modes and aspects of transportation, and contains an on-line computerized file of transportation research information.

U.S. Roads

<http://www.usroads.com/>

Provides access to journal articles on a variety of topics, including environmental issues relating to road transportation and safety; also provides links to other transportation sites.

U.S. Environmental Protection Agency

<http://www.epa.gov/owow/wetlands/restore>

This site provides information regarding river corridor and wetland restoration efforts, including sources for technical

information, links to related sites, and a listing of restoration projects.

Many DOTs (nine) recognized that several sources of information on ecological mitigation topics already exist and are used by DOT staff. Identified sources included Internet sites operated by the FHWA and CTE, university libraries, and regional and national conferences. These respondents did not identify a need for additional methods of information exchange and apparently take advantage of available sources.

Presently, there are several potential sources to search for information on mitigation topics; however, there is no single site dedicated solely to the topic of ecological mitigation by DOTs. Several respondents suggested that a centralized DOT Internet site could be developed so that recent innovations and mitigation approaches could be posted and made available to all DOTs. Similarly, an e-mail listserver was also suggested to provide DOT staff with information requests and responses that will provide current information on ecological mitigation topics.

Two respondents suggested that a mitigation-based newsletter would be another useful method to disseminate DOT mitigation experiences and issues to other DOTs.

Several respondents indicated that information on not just successful projects but also failures would be useful to illustrate the unanticipated pitfalls associated with mitigation activities. Unforeseen problems can arise during the

site selection, design, and implementation phases of a mitigation project. This type of information is rarely discussed at conferences or made available outside the limits of the parties concerned, although the lessons learned from the experience of failures can be invaluable to the restoration community.

Other types of information needed by DOTs address a wide range of issues including regulatory coordination and sources of information for techniques for mitigation design, design details, specifications, monitoring methods, and highway permeability (fish and wildlife passage). A general observation from several DOTs is that the majority of information does not cover ecological mitigation topics or examples from the interior west but is focused on coastal states.

It is apparent from the survey responses that a problem of information access exists among some DOTs. The Internet sites noted previously could be expanded to address specific topics related to ecological mitigation, such as impact assessment methodologies, monitoring protocols, wetland mitigation, stream restoration, and wetland banking. With the extensive amount of information and reports currently available through Internet sources it will be difficult to provide a single site that addresses all of the topics contained within ecological mitigation. Improving DOT staff awareness could be obtained through the development of a directory of Internet sites, literature search services, periodicals, and journals that focus on environmental issues of transportation projects.

CONCLUSIONS

The linear nature of roadway corridors can increase their influence on the natural environment. Construction of new or expanded roadways leads to the permanent conversion of the landscape, resulting in the fragmentation and loss of habitat. In addition, roadways continue to influence the landscape after construction by serving as a source of stormwater runoff, noise, and an impediment to fish and wildlife movement. In the past decades, transportation agencies have made great strides in identifying and addressing the impact of roadway construction, expansion, and maintenance on ecological resources through improved management and incorporation of mitigative measures. The recognition of an “ecosystem approach” in transportation development has aided the DOTs and regulatory agencies in defining the scope of potential impacts and the appropriate mitigation measures to address these impacts.

This synthesis has summarized available information on the types of ecological impacts incurred by highway projects and the methodologies used to assess these impacts. The synthesis also addressed the procedures for determining the need for mitigation and monitoring, the types of mitigation implemented and how mitigated sites are monitored, methodologies for the evaluation of mitigation success or failure—benefits and effectiveness, and the costs of mitigation. The findings and conclusions of this report reflect recent DOT efforts to assess and mitigate transportation-related impacts to aquatic and terrestrial resources.

Transportation projects, whether new roadway construction, widening, or infrastructure upgrades, typically result in impacts to natural resources. Transportation agencies and regulatory agencies are well versed in the processes to identify, evaluate, and regulate these impacts. The Section 404 and Section 401 programs of the Clean Water Act were identified by DOTs as the primary regulatory mechanisms that establish mitigation requirements for transportation project impacts to aquatic resources. Compliance with the Endangered Species Act and the National Environmental Policy Act (NEPA) are additional means by which DOT-sponsored ecological mitigation activities are required.

Some state DOTs have established environmental initiative/stewardship programs whereby ecological mitigation projects, typically on a small scale, are incorporated into transportation projects to address a local need, such as habitat enhancements, culvert retrofits, or stream restoration

projects along a roadway alignment. DOTs in Maryland, New York, North Carolina, and Virginia have initiated programs that provide funding and support for stream restoration projects either through environmental initiative programs or by providing funding to state resource agencies to perform the work.

The impact assessment methods identified by DOTs typically are semi-quantitative or qualitative assessment methods that address wetland impacts. Several DOTs use regional standardized qualitative methods to assess wetland impacts because they are easy to use, economical, and are accepted by regulatory agencies. In the absence of a standardized method, other DOTs rely on best professional judgment to assess wetland functions and potential impacts.

Mitigation of these impacts is typically determined through the NEPA review process and/or as part of federal and state permit conditions. A primary area of ecological mitigation addressed by DOTs is in the area of wetland mitigation. The strategy employed by DOTs to mitigate for wetland impacts is varied and reflects the regional concerns of the U.S. Army Corps of Engineers (USACE) districts and state resource agencies. Mitigation may include DOT-performed wetland mitigation (restoration, creation, enhancement, and preservation), the purchase of wetland bank credits, or use of an in-lieu fee program.

Transportation agencies have also provided mitigation to improve highway permeability by providing specialized overpasses and underpasses for wildlife crossing with the goal of maintaining habitat connectivity and reducing road kills. DOTs are also using new culvert designs to improve fish passage in new roadways and retrofits. Other new technologies are also being incorporated into some roadway designs to treat stormwater runoff and improve water quality to protect aquatic organisms.

Several USACE districts and state and tribal regulatory agencies, including those in California, Oregon, Washington, Kentucky, Tennessee, North Carolina, Virginia, West Virginia, and Pennsylvania, require DOTs to mitigate for stream impacts by providing specific mitigation in the form of stream restoration activities, whereas other DOTs do not face such regulatory requirements.

The cost of mitigation projects is viewed by transportation agencies as part of the “cost of doing business.” In

general, DOTs are only beginning to develop databases to track the costs of mitigation efforts. Earlier efforts to document mitigation costs have focussed on wetland mitigation projects and have shown that such projects can vary widely from site to site and from region to region. Likewise, the cost for long-term monitoring and management appears to vary significantly. The costs for other forms of mitigation were not well documented in the literature.

There are regional differences in the type of impacts that require mitigation and the mitigation approaches that are used by DOTs and accepted by regulatory agencies. The USACE districts apply the “no-net-loss” guidelines to wetland impacts differently based on regional concerns. Some districts require greater burdens of proof to define mitigation success.

Transportation agencies are also looking for more flexibility in mitigation requirements and the type of mitigation that would be acceptable to agencies. This includes the use of in-lieu fee programs (example in Appendix C), consolidated mitigation, and allowing out-of-kind mitigation. In some instances, FHWA divisions may not always approve the use of federal funds to cover in-lieu fee costs of regulatory agency approved mitigation strategies. Transportation agencies are generally seeking to remove themselves from the long-term stewardship roles that are typically required to monitor and maintain mitigation projects. Federal cost sharing does not cover these long-term costs associated with monitoring and maintaining mitigation projects.

The following are suggestions for further research and operational actions:

- Develop a standardized database to track types, success/effectiveness/benefits, and costs of DOT mitigation projects. Without some form of standardization, the variability in the recorded information would

probably make regional comparisons difficult. However, mitigation projects generally have costs that are unique to each project and variability is expected; how costs are lumped together or split could make comparisons problematic.

- Define the costs to DOTs for the maintenance of mitigative measures and examine how cost-sharing arrangements can be extended to cover monitoring and maintenance activities.
- Encourage collaboration among transportation and regulatory agencies to define the goals and requirements for in-lieu fee programs.
- Develop a working definition of “flexible mitigation” that can be implemented.
- Examine the consistency in funding mitigation projects nationwide.
- Assess the state-of-the art for evaluating non-wetland (i.e., stream channel, riparian zone) impacts and mitigation of these impacts (e.g., fish passage structures, vegetated buffers, and gradient control structures).
- Develop a central web-based access point for geographic information system-based site files.
- Develop a central website where transportation agencies can submit descriptions of successful/effective/beneficial ecological mitigation projects for access by and guidance of interested parties.
- Develop project environmental mitigation that addresses watershed needs and not just direct on-site mitigation for the highway improvement projects. Examine participant’s roles in watershed management initiatives.

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APPENDIX A

Survey Questionnaire

NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM

Project 20-5, Topic 31-12

Ecological Mitigation

Questionnaire

The Louis Berger Group, Inc. has been retained by the Transportation Research Board to investigate ecological mitigation practices for highway projects. At present, there is a lack of consistent information on the implementation and results of ecological mitigation efforts. Through National Cooperative Highway Research Program Project 20-5/Topic 31-12, we are seeking to document current highway practices as they apply to aquatic (may include wetlands) and stream corridor (riparian) habitats.

An important component of this project is to survey transportation and environmental professionals to find out directly what your experiences have been with the ecological mitigation process. This questionnaire addresses many aspects of the process, ranging from the initial ecological impact assessment phase to the evaluation of mitigation success. Thus, it may be appropriate for different individuals to fill out the various parts of the questionnaire. If so, please make sure the respondent for each part is identified and that the complete questionnaire is returned as a single response of the reporting agency.

If you have any reports relevant to the issues raised in this questionnaire (i.e., methodologies, case studies), we would appreciate receiving copies. They will help us fully assess the topic of ecological mitigation.

Thank you for your time and effort. We are confident that, with your participation, this project will provide the thorough and comprehensive coverage necessary to synthesize the current issues surrounding ecological mitigation.

PLEASE RETURN QUESTIONNAIRE AND SUPPORTING DOCUMENTS BY: July 30, 2000

Return to: Mr. Ed Samanns
The Louis Berger Group, Inc.
100 Halsted Street
East Orange, New Jersey 07018

If you wish, you may fax your response to 973-672-4284. If you have any questions, please call 800-323-4098, x486

THANK YOU FOR YOUR ASSISTANCE ON THIS PROJECT

SECTION 1.0 BACKGROUND INFORMATION

Please complete the following request for information to aid the processing of this survey.

Name _____

Title _____

Agency _____

Division/Department _____

Address _____

City _____ State _____ Zip _____

Phone _____ Fax _____ Email _____

SECTION 2.0 ECOLOGICAL IMPACT ASSESSMENT

We are seeking information on ecological impacts to aquatic (may include wetlands) and stream corridor (riparian) habitats. We want to document types of impacts from highway projects and impact assessment methodologies used. Please list, as appropriate, if a question has more than one response.

A. Types Of Impacts

- 2.1 What types of highway projects, proposed or implemented, have been assessed for ecological impacts by (or for) your agency?

- 2.2 For these projects, what types of ecological impacts to aquatic and stream corridor habitats were encountered?

- 2.3 Do the ecological impacts noted above typically require mitigation to offset adverse or unacceptable impacts?

B. Impact Assessment Methodologies

2.4. For each type of ecological impact stated above in Question 2.2, which of the following aspects of potential impacts are addressed?

direct impacts _____ temporary impacts _____

indirect impacts (secondary) _____ permanent impacts _____

cumulative impacts _____

2.5 For each type and aspect of ecological impact stated above in Question 2.4, is there a standard methodology used to assess potential project impacts? If yes, please specify this methodology and describe.

2.6 Identify why each standard methodology was used:

mandated by regulation _____ referred by staff scientists _____

preferred by regulators _____ not sure, have always used this method _____

2.7 Do these methodologies assess quantitative impacts or qualitative impacts?

2.8 If a standard methodology is not used, how is an appropriate assessment methodology selected?

2.9 Do you feel the standard methodology used is always the appropriate methodology? Explain.

2.10 Do you feel there is adequate information available regarding methodologies to permit the selection of a project-appropriate impact assessment methodology?

SECTION 3.0 ECOLOGICAL MITIGATION ASSESSMENT

We are seeking information on how the need for mitigation and monitoring is determined; the types of mitigation implemented and how these efforts are monitored; and how mitigation success is evaluated. Please list, as appropriate, if a question has more than one response.

A. Need For Mitigation

3.0 What specific regulations or non-regulatory considerations drive your mitigation efforts?

3.1 For each type of ecological impact you have assessed, is there a standard, consistent determining factor for the need to mitigate?

If yes, what are the determining factors? Are they quantitative or qualitative?

If quantitative, is there a threshold level at which mitigation is required (e.g., # acres, # linear feet)?

3.2 How and by whom were determining factors established (e.g., a specific regulatory agency, a particular study or manual)?

3.3 Is the application of these factors fixed or flexible? In what way?

3.4 In your opinion, are there any ecological impacts that are not mitigated because mitigation is not required and/or because the impacts are not regulated? Yes? No?

If yes, what impacts are these?

3.5 Would mitigation of these impacts be considered if regulatory credits were given?

3.6 Is regulatory credit given for avoidance and/or minimization or is only compensatory mitigation considered?

B. Types of Mitigation

3.7 What types of mitigation measures do you implement to offset the ecological impacts you have identified?

3.8 Is there a standard procedure that helps you determine how to mitigate for a particular type of impact? If so, explain.

3.9 Are there constraints that force you to mitigate in one way while preventing you from mitigating in other ways? If so, explain.

3.10 Are there instances where the compensatory mitigation is not the same as the impacted resource? If so, explain.

C. Mitigation Success

1. Goals And Objectives

3.11 What are the goals and objectives of the mitigation measures discussed above?

3.12 How and by whom are these goals and objective established?

3.13 Is mitigation success based on the degree to which these goals and objectives have been achieved?

2. Monitoring Methods

3.14 For each type of ecological mitigation project implemented, are there standard, consistent methodologies used to monitor conditions at mitigation sites to determine if mitigation has been successful? Please list below.

3.15 Are these monitoring methodologies quantitative or qualitative? Explain.

3.16 Identify why each standard methodology was used?

mandated by regulation _____ preferred by staff scientists _____

preferred by regulators _____ not sure, have always used this method _____

3.17 If a standard monitoring methodology is not used, how is a monitoring technique selected?

3.18 Who conducts the monitoring?

3.19 How long is the site monitored? How and by whom is the monitoring time determined?

3. Measures Of Success

3.20 Are there specific measures of the monitoring that are used to indicate success (e.g., comparison to a reference site, percent cover)? Describe.

How and by whom are these success indicators established?

Do these success indicators provide an accurate measure of achieving the mitigation goals and objectives of Question 3.11?

3.21 What mitigation efforts have you considered successful? Why? Please cite specific examples.

3.22 Have these efforts also been considered successful by others (i.e., regulatory agencies, non-regulatory groups and agencies, interagency groups)? Why or why not?

3.23 Have there been instances where mitigation measures considered to be unsuccessful (or failures) have met the goals and objectives of Question 3.11 (e.g., A mitigation effort to create an emergent wetland ends up as a scrub-shrub wetland. Is this a success or failure?)

3.24 In what ways have mitigation efforts satisfied regulatory requirements?

3.25 What mitigation efforts have you considered not to be successful? Why? Please cite specific examples.

3.26 For efforts that were not successful, what should have been done differently to make it successful?

SECTION 4.0 ECOLOGICAL MITIGATION COSTS

4.1 What have been the costs, financial and otherwise, to achieve mitigation success?

Cost of Implementation

Cost of Monitoring

4.2 Who incurs the costs of mitigation implementation? Who incurs the cost of monitoring?

4.3 Was the success worth these costs? Why or why not?

4.4 Are there better uses for funds that would be consistent with the objective of offsetting ecological impacts?

SECTION 5.0 FUTURE MITIGATION

5.1 Based on your experience and the needs of your agency, what types of mitigation efforts should be proposed in the future? What types should not be proposed? Why?

5.2 What alternative strategies for offsetting ecological impacts would you suggest?

5.3 What do you consider lessons that have been learned regarding ecological mitigation?

- 5.4 Are you familiar with any ecological mitigation project that would serve as an instructive case study example of new and innovative ecological mitigation approaches and strategies? Or any which would serve as an example of a problematic mitigation effort?

SECTION 6.0 ECOLOGICAL MITIGATION INFORMATION TRANSFER

- 6.1 Do you feel that there is available and accessible information regarding ecological mitigation nationwide?

- 6.2 Do you feel available information is weighted towards certain regions and ecosystems? In what ways?

- 6.3 Do you feel there is a need for a system of information exchange? What kind of system?

- 6.4 What kind of information would be most useful to you?

Thank you again for your assistance

APPENDIX B

List of Survey Respondents

Alaska Department of Transportation and Public
Facilities (DOT&PF)
Statewide Design and Engineering Services Division

California Department of Transportation (Caltrans)
Division of Environmental Analysis

Connecticut Department of Transportation (ConnDOT)
Office of Environmental Planning

Florida Department of Transportation (FDOT)
Environmental Management Office

Georgia Department of Transportation (GDOT)
Division of Preconstruction
Office of Environment/Location

Hawaii Department of Transportation (HDOT)
Highways Division

Indiana Department of Transportation (INDOT)
Environment, Planning and Engineering Division
Environmental Assessment Section

Louisiana Department of Transportation and
Development (LaDOTD)
Environmental Section

Maine Department of Transportation (MDOT)
Office of Environmental Services

Minnesota Department of Transportation (MnDOT)
Office of Environmental Services

Mississippi Department of Transportation (MDOT)
Environmental Division

Missouri Department of Transportation (MoDOT)
Design Division, Environmental Section

Montana Department of Transportation (MDT)
Environmental Services

Nebraska Department of Roads (NDOR)
Project Development Division Environmental Section

Nevada Department of Transportation (NDOT)
Environmental Services Division

New Hampshire Department of Transportation
(NHDOT)
Bureau of Environment

New Jersey Department of Transportation (NJDOT)
Division of Project Development, Bureau of
Environmental Services

New York State Department of Transportation
(NYSDOT)
Environmental Analysis Bureau

North Carolina Department of Transportation
(NCDOT)
Project Development and Environmental Analysis
Branch

Pennsylvania Department of Transportation (PennDOT)
Bureau of Environmental Quality

South Carolina Department of Transportation (SCDOT)
Environmental Management

Tennessee Department of Transportation (TDOT)
Environmental Planning and Permits Division

Texas Department of Transportation (TxDOT)
Environmental Affairs Division

Virginia Department of Transportation (VDOT)
Environmental Division, Aquatic Ecology


West Virginia Department of Transportation (WVDOT)
Engineering Division
Environmental Services Section

Wisconsin Department of Transportation (WisDOT)
Division of Transportation Infrastructure Development
Bureau of Environment

Wyoming Department of Transportation (WYDOT)
Environmental Services

APPENDIX C

Example Agency Documents

To:			New York State Department of Transportation ENGINEERING INSTRUCTION	EI 99-026
Title: Environmental Initiative Guidelines and Procedures				
Distribution:		Approved:		
<input type="checkbox"/> Manufacturers (18)	<input type="checkbox"/> Surveyors (33)	<u>Original Signed by Paul T. Wells</u> <u>7/21/1999</u> Paul T. Wells, Assistant Date Commissioner Office of Engineering		
<input checked="" type="checkbox"/> Main Office (30)	<input checked="" type="checkbox"/> Consultants (34)			
<input type="checkbox"/> Local Govt. (31)	<input type="checkbox"/> Contractors (39)			
<input checked="" type="checkbox"/> Regions/Agencies (32)	<input type="checkbox"/> _____ ()			

This Engineering Instruction (EI) does not supersede any previous issuances.

EFFECTIVE DATE:

This EI is effective immediately.

PURPOSE:

This Engineering Instruction (EI) provides guidelines and procedures for implementing the Environmental Initiative. These materials will be incorporated into updates of various Department manuals, such as the *Design Procedures Manual*, the *Environmental Procedure Manual*, the *Highway Design Manual*, and the Department's *Policy and Procedures Manual*.

TRANSMITTED MATERIAL:

Three appendices are transmitted with this EI:

1. Examples of Environmental Initiative Practices, Features, Programs and Activities;
2. State Laws Authorizing Funding for Environmental Protection and Enhancement; and
3. FHWA Policies and Funding Programs Supporting Environmental Protection, Mitigation, and Enhancements.

BACKGROUND:

As New York State's largest public works agency, the Department of Transportation (DOT) has an obligation and responsibility to the people of New York to protect, improve and enhance the environment. Strict regulatory compliance is only part of DOT's responsibility. This Department can and should use its organizational strengths and its employees' personal sense of environmental stewardship to contribute affirmatively to the State's environment and to proactively partner with communities to improve the environment and context sensitive design issues. Context sensitive design is the proactive approach to design that looks at the project within the context of its site, and gathering and including the public's input throughout the design process.

To that end, the Environmental Initiative is a Department-wide effort to:

- promote an environmental ethic throughout the Department,
- advance State and federal environmental policies and objectives, and
- strengthen relationships with environmental agencies and the public.

The Environmental Initiative was approved by the Department's Program Policy Committee on April 7, 1998 and was publicly announced by Governor Pataki on October 20, 1998. The DOT Environmental Initiative Statement is contained on the Department's Web-page.

NEPA and SEQR, and many other State and federal environmental regulations, require that environmental considerations be addressed in transportation decision making, plans and programs. Most transportation capital and maintenance projects have the potential to affect natural and human-made resources in both positive and negative ways. The Department must ensure full and objective consideration of all reasonable alternatives that avoid adverse impacts to the environment and communities. Where adverse impacts are unavoidable, the Department must identify the impacts and incorporate measures to mitigate impacts to the maximum extent practicable.

GUIDELINES:

It is the mission of the New York State Department of Transportation to ensure our customers – those who live, work and travel in New York State – have a safe, efficient, balanced and environmentally sound transportation system.

Within the context of the Department's mission and this initiative, it shall be the practice of the Department of Transportation to:

- Coordinate and communicate closely with State and federal resource agencies to identify opportunities to advance State and federal environmental policies, programs and objectives.
- Ensure that all necessary steps are taken in planning, design, and construction to avoid and minimize adverse effects of transportation projects and operations on important elements of the environment and adjacent communities.
- Proactively plan, design, construct and maintain transportation projects in an environmentally sound manner using context sensitive design to meet transportation needs while at the same time protecting, conserving, restoring or enhancing important natural and man-made resources.
- Incorporate into DOT capital and maintenance projects specific design features or facilities to mitigate unavoidable adverse impacts to the environment.
- Consider and implement, as appropriate, measures to enhance natural and man-made resources above and beyond project-specific permit and mitigation requirements.

- Incorporate, where practicable, environmental projects funded by local agencies or groups into ongoing DOT projects as "Environmental Betterments."
- Promote an environmental and context sensitive design ethic within all Department organizations.

ROLES AND RESPONSIBILITIES:

Regional Directors and Main Office Division Directors are responsible for implementing the Department's Environmental Initiative in their respective program areas.

ENVIRONMENTAL INITIATIVE EXAMPLES:

The Department already does an excellent job of providing project-specific avoidance, minimization, and mitigation in transportation projects. In many instances, the Department also provides important environmental enhancements through close coordination with municipalities and State and federal resource agencies. However, a primary goal of this initiative is to encourage proactive consideration and implementation of context sensitive design and construction and maintenance practices beyond permit and mitigation requirements. See "Appendix A" for examples of features, practices and programs that should be incorporated into DOT capital and maintenance projects to improve DOT's current environmental performance.

FUNDING:

- A. State and federal highway funds shall continue to be used for project-specific avoidance, minimization, mitigation and enhancement efforts. They may also be used to advance this Environmental Initiative consistent with State and federal funding programs.
 - See "Appendix B" for State laws that support funding for environmental measures.
 - See "Appendix C" for FHWA policies and funding programs that support environmental protection, mitigation and enhancements actions.
- B. Other State agencies, municipalities and non-governmental organizations should be invited to provide funding for "Environmental Betterments" for inclusion in Department transportation projects.

PROCEDURES:

A. ACTIONS TO IMPLEMENT THE ENVIRONMENTAL INITIATIVE

All Region and Main Office program areas shall identify and implement specific actions in their areas of responsibility to incorporate the Environmental Initiative into their operating and business practices pursuant to the Deputy Commissioner and Chief Engineer's memorandum on the Environmental Initiative, dated September 29, 1998. The Environmental Analysis Bureau (EAB) has issued recommendations for model plans. EAB is reviewing plans prepared by Region and Main Office units.

B. COORDINATION AND COMMUNICATION WITH OTHER AGENCIES

1. DOT Regional Directors shall meet quarterly with their counterpart DEC Regional Directors to:
 - a) discuss progress under the Environmental Initiative,
 - b) review DOT's five-year capital construction and annual maintenance program,
 - c) identify opportunities to improve resource protection and enhancement practices, and
 - d) exchange lists of contact people.
2. DOT Regional Landscape/Environmental Managers shall meet monthly, or as mutually agreed upon, with their DEC counterparts to:
 - a) discuss progress under the Environmental Initiative,
 - b) identify specific opportunities to include resource protection and enhancement practices in DOT projects, and
 - c) update lists of contact people.
3. DOT Regions shall meet as needed with DEC to progress individual projects through existing project development and permit review processes.
4. DOT Regions are encouraged to establish similar meetings with other State and federal resource agencies, as appropriate, with coordination assistance by EAB.

C. PUBLIC INVOLVEMENT

DOT's Regional Planning and Program Management and Regional Design Groups shall take leadership roles in expanding use of existing project planning and development processes to communicate with, solicit and encourage input from municipalities, environmental interest groups, citizens groups, corporations and the general public to assure early and full consideration of environmental and community concerns and innovative context sensitive solutions in transportation projects.

D. JOINT DEVELOPMENT

DOT Regional Design Groups should look for opportunities for joint development with municipalities, other agencies, and private developers whereby design, construction, land acquisition and maintenance responsibilities can be mutually and equitably shared. In some instances, for example, a combined stormwater management facility (e.g., an extended detention basin) might be sized and constructed to serve the stormwater needs of both DOT (for highway drainage) and of an adjoining land owner, such as another State agency, a municipality, or a corporate owner. DOT, for example, might cover the design and construction costs if the public or private owner provides the land for the facility and agrees to maintain it.

E. ENVIRONMENTAL BETTERMENTS

Specific environmental elements or facilities requested and funded by others (e.g., municipalities, other agencies, environmental groups) may, wherever practicable, be incorporated in DOT capital and maintenance projects as "Environmental Betterments." These elements or facilities may include, but not be limited to, landscaping, park amenities, historic building preservation, noise barriers, created wetlands, stream restorations, stormwater basins, habitat improvements, and new municipal sanitary sewer lines, storm sewer lines and water mains that provide an environmental benefit.

These Environmental Betterments should benefit from the "economies of scale" possible on large public works projects and could cost the sponsors less than individual projects designed, constructed and let by themselves.

As part of the Department's proactive public outreach effort, DOT Regional Design should invite local municipalities, environmental groups and agencies to combine their funded and designed environmental elements or facilities with ongoing DOT projects. The Department will provide added design services to assure that the "Environmental Betterment" work is appropriately integrated into the transportation project plans and specifications. The Department may provide contract letting and construction inspection of the Environmental Betterment work at no charge to the municipality, other agency or environmental group.

F. CONTEXT SENSITIVE DESIGN

An essential element in the implementation of the Environmental Initiative is context sensitive design. Context sensitive design strives to provide a product that is in harmony with the community because it considers the environmental, scenic, historic and natural resources of the area. Projects that recognize community goals, are designed, built and maintained with a minimal disruption to the community, add value and are sustainable are context sensitive projects. The Design Division will be developing written guidance on context sensitive design.

G. PROGRAM UPDATE

The Environmental Initiative has been identified as a component of the Department's Capital Program Update process. As of August 1998, Regional Planning and Program Managers are required to include Environmental Initiative projects on their updated program. Regions are requested to identify those projects that have environmental or context sensitive design work which goes above and beyond regular mitigation or permit requirements. Any external coordination that has occurred with outside agencies or interested groups should also be identified. Regional Design shall provide appropriate information for the annual updates.

H. PROJECT AND PROGRAM MANAGEMENT INFORMATION SYSTEM (P/PMIS)

Environmental Initiative projects will be identified and tracked using the Department's Project and Program Management Information System (P/PMIS). Environmental Initiative work will be identified as a project attribute in P/PMIS. Various work types will allow environmental initiative projects to be grouped by a specific activity, (e.g., water quality improvement, wetland mitigation).

Until P/PMIS access permissions are defined in the Regions, Regional Design shall provide the appropriate information for data entry to the appropriate group. EAB shall regularly generate management reports from P/PMIS, allowing the Department to track Environmental Initiative projects and subsequent activities.

I. MASTER PLAN IMPLEMENTATION

The Environmental Initiative also plays a role in implementing the Department's 1998 State Transportation Master Plan, "The Next Generation: Transportation Choices for the 21st Century." For example, several needs were identified by Regional DOT offices that relate to environmental processing, including better coordination with outside agencies, a proactive approach to public outreach, and presenting a more positive image of the Department. The initiative directly addresses these needs and will indirectly improve the Department's image, while improving the quality of life for New York State residents.

J. INCLUSION INTO DEPARTMENT GUIDANCE DOCUMENTS

All Divisions and Bureaus shall incorporate into their respective manuals appropriate guidance to support the Environmental Initiative.

For example, the *Design Procedure Manual*, Appendix B, already includes guidance on documenting Environmental Initiative actions in the design approval documents. The Environmental Analysis Bureau will incorporate portions of this EI into the *Environmental Procedures Manual* and the Design Quality Assurance Bureau will incorporate appropriate information in the *Highway Design Manual* and the *Design Procedure Manual*.

K. KEY RESULT AREAS

The Environmental Initiative will help the Department advance the following four **Key Result Areas**. Office of Engineering Division staff shall support KRA reporting as appropriate.

- **Public Involvement:** The Department will use the Environmental Initiative to encourage earlier involvement of municipal officials, environmental groups and the general public in DOT project planning and development processes. This will help to identify local community and environmental concerns, obtain timely input on project alternatives, and identify opportunities for inclusion of local "Environmental Betterments."
- **Economic Development:** Improvements to public access and the aesthetic character of transportation corridors will support eco-tourism, a growing and sustainable part of New York State's economy.
- **Public Sector Partnerships:** Partnering under the initiative will enhance our positive working relationship with municipalities, other State and federal resource agencies and with environmental organizations.
- **Continuous Improvement:** The Department will use the initiative to improve the quality of DOT delivered projects, programs and services through thoughtfully managed and environmentally sound planning, design, construction and maintenance actions.

CONTACT PERSON

Questions regarding this Engineering Instruction should be directed to Gary McVoy or Mark Sengenberger at (518) 457-5672.

APPENDIX A

EXAMPLES OF ENVIRONMENTAL INITIATIVE PRACTICES, FEATURES, PROGRAMS AND ACTIVITIES

A. The following are examples of practices or features that should be incorporated into DOT capital and maintenance projects, as appropriate:

- the practice of context sensitive design,
- street ambience enhancements (e.g., benches, decorative paving, bollards, period lighting fixtures),
- restoration of historic highway related features (e.g., historic lighting fixtures, stone walls, guiderails),
- measures to retain the integrity of historic parkways and bridges,
- increased wild flower plantings,
- additional landscaping to enhance the appearance of noise barriers,
- increased landscape plantings to improve roadside appearance and streetscapes,
- new or rehabilitated fishing access and trail head parking areas,
- new or rehabilitated boat and canoe launch sites,
- new or rehabilitated historic markers and interpretive signing,
- increased signing of important waterways and watersheds,
- new or rehabilitated scenic overlooks,
- retrofits of existing highway drainage systems with created wetlands and stormwater management facilities,
- soil bio-engineered stream banks,
- plantings, boulders, deflectors and other techniques to improve fisheries habitat,
- culverts for wildlife crossings,
- new or rehabilitated wildlife viewing sites,
- wildlife habitat improvements,
- mitigation and enhancement for past wetland impacts,
- restored and enhanced wetlands,
- acquisition of endangered species habitat,
- acquisition for preservation of regionally important wetlands and upland habitat,
- acquisition of scenic easements,
- improvements to highway entrances of public parks, wildlife management areas, and historic sites and
- replacement of fixed-time traffic signals with vehicle activated signals

B. The following are examples of some of the practices and programs that should be considered to improve DOT's current environmental performance:

- continue to identify improved ways to use deicing materials and abrasives,
- improve efforts to sweep/collect/recycle the roadside abrasives in the spring,
- continue efforts to reduce herbicide use,
- clean up wastes previously generated at DOT projects and facilities,

- encourage and implement Transportation Demand Management, Transportation System Management' and Intelligent Traffic System practices,
- encourage alternatives to single occupancy vehicle commuting,
- expand Ozone Alert Day initiatives,
- promote alternative fueled vehicles,
- increase support for mass transit,
- pilot and promote the use of recycled tires in highway embankments; glass, plastics and aggregate in pavements; and plastic, rubber and aggregate in noise walls,
- preserve historic structures and
- promote State bike routes and greenways

C. The following are some examples of technology transfer and data sharing activities with other local, State and federal resource and highway agencies to advance environmental stewardship in the transportation industry:

- provide and/or participate in joint training,
- share standard details, specifications, and best management practices,
- share guidance manuals and handbooks,
- conduct joint research and share results,
- exchange GIS data sets,
- identify agency points of contact and subject matter experts,
- exchange staff phone numbers and e-mail addresses and
- participate and present at relevant State and national conferences

APPENDIX B**STATE LAWS AUTHORIZING FUNDING FOR
ENVIRONMENTAL PROTECTION AND ENHANCEMENT**

- State Highway Law Article 2 Section 21 - "The commissioner of transportation is hereby authorized and empowered to acquire property for the restoration, preservation and enhancement of natural or scenic beauty of areas traversed by state highways, in order for the state to comply with any federal aid highway acts."
- State Highway Law Article 2 Section 22 - "The commissioner of transportation is hereby authorized and empowered to acquire property in order to provide multi-use areas adjacent to state highways and recreational, natural and scenic areas along, but not necessarily contiguous to, state highways, except that the commissioner may acquire property anywhere in the state for the purpose of constructing bikeways. Such multi-use areas may be utilized for, but not limited to walking, hiking, bicycle, trailbike, recreational vehicle and snowmobile trails and the installation of public utilities. Such acquisitions shall constitute a state highway purpose. Property acquired for multi-use areas shall be such as to complement the highway facilities by providing the multi-use areas adjacent to the highway facilities. Property acquired for recreational, natural and scenic areas along, but not necessarily contiguous to, state highways shall consist of predominantly unimproved, natural or scenic areas suitable to serve the recreational needs of the expanding population of the state, and shall lend itself to restoration, preservation or enhancement as a recreational, natural or scenic area or provides visual access from the highway to such area. The commissioner is hereby authorized to undertake work of construction, improvement, restoration, preservation or enhancement of such areas and the expense of such work may be a proper charge against funds available for the construction, restoration, improvement or maintenance of state highways....Such acquisitions and work in recreational, natural or scenic areas may be undertaken in cooperation with other state departments or agencies and provision shall be made for the funding of such acquisitions and work."
- State Highway Law Article 3 Section 30.2 - "The commissioner of transportation, for and in behalf of the people of the state of New York may acquire, pursuant to the eminent domain procedure law any and all property necessary for the construction, reconstruction and improvement of state highways and bridges or culverts on the state highway system, including the appropriation of property for drains, ditches, spoil banks, gravel pits and stone quarries."

APPENDIX C

FHWA POLICIES AND FUNDING PROGRAMS SUPPORTING ENVIRONMENTAL PROTECTION, MITIGATION, AND ENHANCEMENTS

Eligibility of Federal-aid for Environmental Initiatives

It is the Federal Highway Administration's policy to-

1. **Avoid, minimize, and mitigate** to the fullest extent possible the adverse effects of transportation programs and projects on the neighborhood, community, and natural resources.
- B. Seek opportunities to go beyond the traditional project mitigation efforts and implement **innovative enhancement measures** to help the project fit harmoniously within the community and natural environs.
- C. Participate, to the fullest extent permitted by law, in funding **mitigation and enhancement activities** required by Federal, State, and local statutes and regulations for project related impacts to the natural environment, neighborhoods, and communities.

Note that all activities that are approved mitigation as a result of the project development process under the National Environmental Policy Act are eligible for the class of federal-aid of the project. Mitigation outside of the project limits is encouraged when it is more cost effective than mitigation on-site and serves the same purpose.

Interstate Maintenance	IM	23 USC 119
National Highway System	NHS	23 USC 103(l)
Surface Transportation Program	STP	23 USC 133
Highway Bridge Replacement and Rehabilitation	HBRR	23 USC 144
Congestion Mitigation/Air Quality	CMAQ	23 USC 149

Below is a table of environmental activities that go beyond required mitigation, and the applicable federal funding categories which can be used to fund these activities.

Note: the explanation of each work type follows the table.

Environmental Initiative	Incidental to construction of an otherwise eligible federal-aid project	Stand Alone federal-aid project		WorkType
	Eligible Categories		Comments	
Mitigation of Water Pollution Due to Highway Runoff	All	STP only	NHS if maintaining natural habitat or wetland	1
Create Stormwater Management Structures	All	STP only		1

Bio-engineered Streambanks	All	All	Where needed to protect the stability of the highway	1
Specialized Water Quality Inlet Structures such as low flow fish channels	All	STP or NHS	As part of habitat improvement	1
Create, Conserve, and Restore Wetlands or other natural habitat	All	STP or NHS		2
Working with others to preserve important existing wetland sites	NA	NA		2
Protect Fish and Wildlife Habitat	All	STP or NHS		3
Boulders and Stone Weirs to improve fisheries habitat	All	STP or NHS		3
Culverts for Wildlife Crossings		STP or NHS		3
Plantings for Wildlife Habitat	All	STP or NHS		3
Bird nesting boxes or bat houses	All	No	Could be eligible as an incidental to a stand alone project to enhance wildlife habitat or wetland	3
Environmental Mitigation to reduce vehicle caused wildlife mortality while maintaining habitat connectivity Installation of fencing in critical wildlife crossing locations Construction of wildlife underpasses, wall openings, or culverts Construction of wildlife shelves under structures crossing streams Lower or enlarge culverts for fish passage	All	STP or NHS	Only in the context of safety for a stand alone project, can use STP if an endangered species	3
Historic Preservation of publically owned sites to be converted to public use	STP only	STP only	Remember, this is not required mitigation.	4
Rehabilitation and Restoration of Historic Transportation Structures	All	STP only	Could use NHS for a stand alone project for historic highways or bridges and HBRR for historic bridges	4
Rehabilitation of Historic Railroad Facilities, Canals, and Ferry Terminals	STP	STP	Could be NHS for ferry terminals	4
Archeological Planning and Research	NA	STP only	Remember, this is not required mitigation.	4
Establishment of Transportation-Related Museums	NA	STP only		5

Promote eco-tourism	STP only	STP only	Must be on a designated scenic byway. Could use other funds for other eligible activities listed in this table	5
New or Rehabilitated fishing access	NHS or STP, IM only to rehab.	STP only		5
Trail head parking areas	All	STP		5
Historic Markers and other interpretive signing	All	STP only	STP as a stand along only on designated scenic byways	5
Promoting State bike routes and greenways	NA	None	STP only on a designated byway	5
Community friendly signals and signs	All	STP or NHS	Must conform to the MUTCD	5,6
Provision of facilities for bicycles and pedestrians Includes adding or improving bike lanes, adding or improving road shoulders, widening curb lanes, providing bike lockers, bike racks, or other bike parking facilities at inter-modal points	All	STP, NHS, or CMAQ	IM cannot be used to add a facility	6
Safety and Educational Activities for Bicycles and Pedestrian	STP, CMAQ	STP, CMAQ		5,6
Scenic or Historic Highway Programs, and Provision of Tourist and Welcome Center Facilities				
Installation of interpretive plaques, signs, aesthetic guiderails	All	STP	Could be IM or NHS for guiderails	5
Restoration of historic highway-related features such as lighting, sidewalks, retaining walls, or historic markers	All	STP or NHS	Not NHS for stand alone project to install historic markers	6
Construction of tourist and welcome centers related to scenic or historical sites	All	STP or NHS	For NHS, has to be linked to a safety rest area	5
Development of scenic overlooks	All	STP or NHS	For NHS, has to be linked to a safety rest area	5
Reforestation of slopes along a scenic/historic highway corridors	All	STP, IM, NHS		6
Development of corridor management plans on a designated scenic byway	NA	STP only		5
Acquisition of Scenic Easements	All	STP only		6

Landscaping and other Scenic beautification Linear highway landscaping, landscaping at interchanges, noise barriers, reintroduction of native or endangered plants, wildflower planting, re-establishment of trees in historic districts	All	STP or NHS		6
Streetscape features including lighting, sidewalk pavers, benches, planting containers, decorative walls and walkways, signs, public art, historical markers, etc.	All	STP	Can use NHS for a stand alone project for pedestrian facilities and any incidentals to that project such as streetscape features	6
Parking Facilities for safety or community development (Off street parking)	All	STP or NHS	Must improve highway or pedestrian safety/operations	6
Preservation of Abandoned Railway Corridors, including conversion and use for Pedestrian and Bicycle Trails	STP only	STP only		6
Control and Removal of Outdoor Advertising	IM, NHS, or STP	STP or NHS	Has to be a controlled Route, see your real estate officer	6
Increase Maintenance on existing facilities	NA	NA	See element specific work for eligible maintenance activities using federal aid (EB 96-034)	
Additional acquisitions to improve pedestrian circulation	All	STP or NHS		6
Increase turf and plantings in median areas	All	No		6
Screen maintenance yards	All	STP or NHS		6
Improve the appearance of construction related storage areas	All	NA		6
Increase the use of recycled materials	All	NA		7
Use tires in highway embankments	All	NA		7
Use glass plastics and aggregate in pavements	All	NA		7
Use plastic rubber and aggregate in noise walls	All	NHS or STP	If noise walls are eligible, this activity is also	7
Use salt and sand for highway deicing more judiciously by utilizing other deicing agents which are less environmentally damaging	STP only	STP only		8
Clean up wastes previously generated at DOT projects and facilities	All	No		8
Improve air quality	All	CMAQ	Possibility of eligibility under other funding	9

Implement Transportation Demand Management practices	All	STP, NHS, or CMAQ		9
Expand Ozone alert day initiatives	CMAQ only	CMAQ only		9
Promote alternative fueled vehicles	CMAQ only	CMAQ only		9
Support mass transit such as park-n-ride lots, bus turnouts, etc...	All	STP, NHS, or CMAQ		9
Signal Conversion from fixed time to traffic actuated	All	STP, NHS, or CMAQ		9
Parking Facilities: Intermodal/Demand management such as fringe (transit) or corridor (car pool transit)	All	STP, NHS or CMAQ		6,9
Combine local enhancement projects with ongoing DOT projects	STP only	STP only	Could qualify for other funds according to this table	any

For any other Environmental Initiative not listed in the table, or for more information, please contact the Federal Highway Administration's New York Division Office at (518) 431-4125.

Work Types in the above table which should be used to identify Environmental Initiative project work:

- 1) {Water Quality} Improvements
- 2) {Wetlands} Creation, Restoration or Enhancement
- 3) {Fish and Wildlife} Habitat Improvements
- 4) {Historic/Cultural Resources} Preservation and Enhancement
- 5) {Eco-Tourism} and Public Access Improvements
- 6) {Corridor Enhancements} Landscaping/Streetscape Enhancements
- 7) {Recycling and Reducing} materials and emissions
- 8) {Remediating} Contamination
- 9) {Air Quality} Improvements

- 1) **Water Quality** - Any project or work activity that improves existing or future biological or chemical quality of a water resource, including streams, rivers, wetlands, drinking water sources, and highway/stormwater runoff. Water quality can be improved by preventing or removing sediments and pollutants; retrofitting highway drainage systems; installing stormwater treatment facilities; preventing or reducing erosion through bioengineering, best management practices (BMP's) use, or training in BMP's and facilities design and installation.
- 2) **Wetlands** - Creating, restoring or enhancing wetland beyond the minimum required in State and federal wetland permits. The creation of new wetland acreage is one form of mitigation for past wetland impacts in which an upland area is converted, typically by excavation or damming, to a flooded or moist soil condition where wetland vegetation, soil, and hydrology will persist. Restoration and enhancement may include adjusting water flow or level onsite, additional planting or seeding with wetland vegetation, improving habitats and vegetation covertype diversity within the wetland, removing invasive plant species, or acquiring regionally important wetland areas for preservation purposes.
- 3) **Fish and Wildlife** - Habitat enhancements made to improve the life of wildlife, including planting specialized food and cover crops along highway corridors, protecting and managing specific habitats deemed valuable to target wildlife species (endangered species), providing wildlife crossings under highways and providing nest boxes and various refuge for wildlife. Fisheries habitat can be enhanced by bioengineering of streambanks and placement of in-stream structures such as boulders and weirs for diversity of cover and nesting sites.
- 4) **Historic/Cultural Resources** - An activity that preserves or enhances the historic or cultural heritage of New York State. DOT is in a unique position to incorporate protection of these resources into projects by preserving historic structures, acquiring or stabilizing archaeological sites, supporting archaeological excavations, developing interpretive programs for archaeological and cultural sites, providing street ambience enhancements (such as period lighting fixtures, bollards, benches, and pavers) and adding additional historic markers and interpretive signs.
- 5) **Ecotourism** - A project enhancement that promotes the use, enjoyment and appreciation of the natural and man-made resources of the State. Ecotourism can be encouraged in highway work projects by simply improving the appearance of roadsides and entrances to natural and cultural features. This can be accomplished by providing new or rehabilitated fishing and boating access and parking, promoting state bike routes and greenways, improving trailhead parking and facilities, and upgrading scenic overlooks and acquisition of scenic easements. Placement of landmark and interpretive signs or identification of important waterways, watersheds and habitats are also potential accomplishments toward increasing ecotourism in New York State.

- 6) **Corridor Enhancements** - Any additions to DOT projects that enhance the visual, aesthetic, and natural character of the roadside or streetscape. These enhancements may include increasing wildflower and roadside plantings, constructing noise barriers, adding landscaping to enhance the appearance of noise barriers, providing streetscape amenities (such as benches, lighting fixtures, decorative pavers), re-establishing street trees, rehabilitating comfort stations and rest areas, incorporating traffic calming features, as well as promoting State bike routes and greenways.
- 7) **Recycling and Reducing Waste/Emission** - Any project that includes innovative ways to utilize recycled materials, reduce waste generated by DOT, or reduce hazardous substance use. In dealing with solid waste, DOT projects may promote the use of recycled tires in highway embankments, recycled glass, plastics and aggregate in pavement mixes and recycled plastic, rubber and aggregate in noise walls. DOT may minimize herbicide applications and sweep roadsides better and more often and develop innovative use of salt/sand and other ice removal substances.
- 8) **Remediating Contamination** - Any project that includes innovative ways to clean up contamination, either previously generated by DOT projects or at DOT facilities or present along DOT Right-of-Way. Whenever possible, promote activities to support brownfield development.
- 9) **Air Quality** - Project elements incorporated to reduce emission levels, resulting in cleaner air. These project enhancements are aimed primarily at reducing single-occupancy vehicles (SOV's). Initiatives that will reduce these emissions include support for mass transit, expanding Ozone Alert Day initiatives, promoting the use of alternative fuel vehicles, encouraging alternatives to SOV's, implementing Transportation Demand Management practices, providing facilities for pedestrians and bicyclists, and replacing fixed-time traffic signals with vehicle-actuated signals, when appropriate.

AGREEMENT ON MITIGATION STRATEGY
pertaining to
IMPLEMENTATION AND OPERATION OF
THE BEACH LAKE MITIGATION BANK

I. INTRODUCTION

The purpose of this document is to implement the terms of the Memorandum of Agreement (May 13, 1991) entered into by the California Department of Transportation, the Federal Highway Administration, the U.S. Environmental Protection Agency, the U.S. Fish and Wildlife Service, the U.S. Army Corps of Engineers, and the California Department of Fish and Game recognizing the importance of early coordination and planning for mitigation of impacts to natural resources. The major goal of early coordination is to identify all opportunities to avoid and/or minimize impacts to valuable resources. A secondary goal is to increase the probability of successfully replacing unavoidable resource losses with high quality replacement habitat, and to realize the maximum benefits from the mitigation expenditure.

Planning for and providing compensation in advance for unavoidable losses from transportation impacts is one approach to minimize the adverse impacts from lost habitat. Advance compensation affords several advantages over the customary method, including: 1) it generally involves a more effective planning effort, often allowing integration into larger efforts that are consistent with and add to regional preservation goals and objectives; 2) the less restrictive time constraints offer the opportunity to evaluate and select the more suitable sites and conditions; 3) advance compensation may reduce temporal losses of wetland functional values; 4) it creates a cooperative atmosphere resulting in more amicable negotiations and early resolution of conflicts; and 5) it may minimize project delays.

The technique of mitigation banking is a method of providing advance compensation for similar impacts from several future projects in a consolidated effort. The additional advantages of a banking approach are: 1) compensation for small losses that otherwise may not be fully or successfully replaced; 2) the consolidation of piecemeal efforts increases management options and larger habitats often provide greater benefits as well as offer greater long-term protection; 3) economies of scale in both creation and maintenance; 4) easier monitoring and evaluation; and 5) public awareness of the habitat restoration can increase the incentive for additional public and private efforts.

II. PURPOSE

The California Department of Transportation (Caltrans) in cooperation with the Federal Highway Administration has proposed

creation of the Beach Lake Mitigation Bank (hereafter referred to as the Bank) on Caltrans property in Sacramento County, south of the City of Freeport. This Agreement on Mitigation Strategy outlines the intention, conditions, and procedures under which Caltrans will restore to high quality habitat a 142 acre parcel at Beach Lake, for the purpose of receiving compensation credit for unavoidable losses to wetland and sensitive upland resources from future transportation projects. The Bank will primarily provide freshwater wetland and woody riparian habitats, but will also create upland components by design (e.g. oak woodland). The needs of endangered species associated with these habitat types will be an important consideration in the design of restored habitats.

Implementation of the bank will facilitate compliance with Executive Order 11990 (Protection of Wetlands), the Clean Water Act (33 USC, 1344), Fish and Wildlife Coordination Act (16 USC, 661-667), and the Federal and California Endangered Species Acts by providing high value replacement habitat for unavoidable impacts associated with Caltrans activities while maximizing benefits to the natural environment. Although it is recognized that off-site mitigation is not the preferred option, it is also recognized that on-site habitat restoration, at times, is impossible to accomplish, can come with such ecological risks that successful mitigation cannot be assured, or can only be accomplished at impracticable cost. Because the Bank is being developed in conjunction with a multi-agency project to restore, enhance, and protect a large tract of wildlife habitat known as the Stone Lakes National Wildlife Refuge, its individual habitat values will be amplified and significantly contribute to regional habitat preservation goals. The Bank will be particularly practical for those projects with minor individual, but substantial cumulative impacts, which is often the case with improvements/modifications to existing transportation facilities. Inter-agency mitigation coordination will be simplified because the bank will provide functioning, high quality habitat in advance of an impact, which can be better evaluated and more easily agreed upon than a paper plan.

This agreement establishes a classification scheme for the habitats that will be the units of exchange in the banking process. It provides the conditions under which the bank can be used for compensation of project impacts. It outlines a methodology for evaluating habitat values for both impacted resources and the bank's replacement resources. It develops the framework for tracking the debiting and crediting of banking transactions. It institutes the standards for maintaining, monitoring, and the long-term management of the bank.

III. GUIDELINES AND POLICIES

The implementation, use, operation and maintenance of the Bank shall be consistent with the following guidelines and/or policy statements

- Memorandum of Agreement on Early Mitigation Planning for Transportation Improvements in California (1991)
- Presidential Executive Order 11990 (1987)
- Applying the Section 404 Permit Process to Federal-Aid Highway Projects
- U.S. Fish and Wildlife Service Mitigation Policy (January 23, 1981)
- Mitigation Banking Guidance U.S. Environmental Protection Agency Region IX (December 20, 1991)
- EPA/ACOE MOA Concerning Determination of Mitigation Under the Clean Water Act Section 404(b)(1) Guidelines (February 6, 1990)
- Senate Concurrent Resolution 17 for the protection of oak woodlands in California (1989)
- Memorandum of Understanding Between the California Department of Transportation and the U.S. Fish and Wildlife Service (1988)
- Memorandum of Understanding Between the Department of Transportation and the Department of Fish and Game Regarding Construction of Transportation Facilities and Protection of Fish and Wildlife Resources (1979)
- U.S. Fish and Wildlife Service Guidance on Mitigation Banking (1983 and 1988)

IV. APPLICABLE ECOREGION

The Bank is established to off-set appropriate habitat impacts from transportation projects in the lower Sacramento Valley and upper San Joaquin Valley. The geographic area, subject to restrictions in Sections V, VI, and VII, is indicated on the map in Attachment A. In general, habitat losses from projects below the 1500 foot elevation in the following counties can be compensated for in the bank:

Amador	Calaveras	Colusa
El Dorado	Nevada	Placer
Sacramento	San Joaquin	Solano
Stanislaus	Sutter	Tuolumne
Yolo	Yuba.	

V. CRITERIA FOR UTILIZING THE BANK

Use of the Bank will be deemed appropriate for compensation of habitat impacts when the following criteria have been met:

- All practicable measures to avoid and minimize resource loss have been incorporated into the project design;
- A delineation of wetlands subject to jurisdiction under Section 404 of the Clean Water Act has been verified by the U.S. Army Corps of Engineers;

- Signatory agencies have agreed that total on-site replacement is not practicable, is inappropriate, or not in the best interest of the long-term protection and maintenance of the resource;
- The impact is within the defined ecoregion, unless an unusual situation exists and use of the bank is agreed to as the most appropriate action by the signatory agencies;
- The habitat being lost must fit one of the defined habitat classes within the bank and having sufficient credit. However, in agreed upon situations a relatively scarce or threatened resource may be substituted as compensation for an abundant one being lost. Out-of-kind mitigation must be agreed upon by all the signatory agencies;
- An evaluation of the impacted habitat's values has been accepted by the resource agencies;
- Functions other than wildlife habitat are adequately compensated for, either within the Bank or by other environmentally acceptable means.

VI. APPROPRIATE HABITAT TYPES

The primary function of the Bank is to provide replacement habitat for losses to freshwater, valley wetlands (excluding vernal pools). Regulatory wetlands identified as freshwater wetlands (seasonal and/or permanent) or woody riparian (scrub-shrub and/or forested) will be mitigable at the Bank.

Design of the Bank will also create upland habitats (e.g. valley oak woodland, native grassland, elderberry savannah) to act as wildlife refugia and buffer areas, and may be used in combination with the wetland habitat, or alone, as appropriate mitigation.

As an ancillary benefit to the creation and restoration of wetland and sensitive upland habitat, the Bank design provides suitable conditions for several State and/or Federal candidate, rare, threatened, and endangered species. As provided for in Section VIII, acreage credited as wetland or upland may also be credited as acreage for endangered species mitigation as appropriate, and if agreed to by the federal and state endangered species offices.

VII. EVALUATION METHOD

The restoration goal of the Bank is to provide a high quality complex of habitats which complement each other and promote diversity and stability. Due to the linear nature of transportation projects, the Bank will primarily be used to compensate for small losses of wetland habitats (usually 1 acre or less, but with an upper maximum of <10 acres) generally already isolated or fragmented with only low to moderate functional values.

Attempting to create numerous distinct and highly specific habitat sub-classes would decrease the likelihood of success, reduce habitat values as each component would necessarily be smaller, not be consistent with current wetland restoration theory and goals, and be extremely expensive. Therefore, it is recognized that in many cases the replacement habitat may not precisely mimic the lost habitat (in-kind), but resemble historic wetlands and aquatic habitats of the Sacramento Valley. To accommodate these variations in specific community composition of the lost habitat and the replacement habitat, the exchange will be made using the following classification system:

- 1) Freshwater Wetland - seasonal
- 2) Freshwater Wetland - permanent
- 3) Woody Riparian - forested
- 4) Woody Riparian - scrub/shrub
- 5) Valley Oak Woodland

Each of these habitat categories have acreage goals and community composition goals as established in the Beach Lake Mitigation Bank Restoration Plan (Attachment B). Target acreages were based upon anticipated mitigation needs, estimates of minimum viable habitat sizes, desirable community complexity and stability, and other practical considerations. In addition, there will be associated upland habitat types which will increase habitat values of the wetland as well as the site as a whole and the Stone Lakes National Wildlife Refuge.

Extensive habitat evaluations by Caltrans will occur annually for at least the first five years of establishment of the Bank. Minimum mandatory evaluation criteria may include the following parameters:

Freshwater Wetland - Seasonal and Permanent

- 1) Species Composition
- 2) Relative Cover
- 3) Vegetation/Open Water Distribution
- 4) Vegetation Vitality
- 5) Hydrologic Monitoring

Woody Riparian

- 1) Species Composition
- 2) Stem Density
- 3) Absolute Cover
- 4) Vegetation Height
- 5) Vegetation Vitality

Wildlife Surveys

- 1) Species Composition

An On-going Monitoring program and a Performance Evaluation program will be implemented for monitoring of the site. Caltrans will prepare a detailed draft Monitoring Plan by November 15, 1993 discussing details of both aspects of monitoring (Performance Evaluation and On-going Monitoring). The other signatory agencies

will review and provide comments on the Monitoring Plan by December 15, 1993, and a final plan shall be produced by February 15, 1994.

Impacted habitat will be evaluated during the environmental assessment process for each project alternative, and classified as seasonal or permanent wetland, or woody riparian. A Caltrans biologist will perform the evaluation and request concurrence from the signatory agencies. Upon request by any of the agencies, an interagency evaluation team will be formed to perform the evaluation.

Compensation habitat evaluations will be reported annually and either the last regular report, or by request a special evaluation, will be used for credit exchange. A pre-restoration evaluation of the site will be used as the baseline for calculating initial available credits.

VIII. DEBIT AND CREDITING PROCEDURES

The Chief, Environmental Branch "C" of Caltrans District 3 will serve as the Bank manager and will perform all duties necessary to maintain the bank account, and all other required records and reports. It will be his/her responsibility to inform representatives from the other signatory agencies, at the earliest opportunity, whenever Caltrans is developing a project which may have habitat impacts that fit the criteria of this agreement and compensation at the Bank may be considered.

Agreement by signatory agencies to utilize the Bank as compensation for specific habitat losses from a project will occur during the CEQA/NEPA process and its documentation. All signatory agencies will be notified by Caltrans when use of the mitigation bank is proposed. Actual debiting of the bank account will take place after the project has final design approval and the appropriate permits, but prior to any activity which could adversely impact the existing habitat values. The bank manager will maintain a running account of all pending debit actions to ensure adequate habitat credits are available before the bank is considered for a new project. The bank manager will send action notices to each agency after each change in balance, credit, or debit.

The "currency of exchange" will be area as measured in acre units. For the three basic habitat types, debits will be made at a 3:1 ratio for woody riparian and 2:1 ratio for freshwater wetland until performance criteria are met. Thereafter, debits will be at a 1:1 ratio as long as the bank habitat continues to meet performance standards. Once a block of habitat credit has been used at its current value, it is no longer eligible to receive additional credit value in the bank account as it matures. Credits will not be available for exchange until conclusion of construction of the mitigation bank.

Debits will not be against any specific plot within the Bank. Instead, debits will be against the total acreage of the habitat category. A running tally of acreage previously debited and credit remaining will be maintained. Out of category exchanges can only be made with the consent of all signatory agencies.

If performance standards have not been met, it may be necessary for an interagency team to re-evaluate management activities, site design, or performance standards for modification or adjustment and for Caltrans to implement remedial actions to correct problems or inadequacies. Debiting from the Bank will cease if habitat values indicate a failure of the restoration effort. Caltrans will be held responsible for remediation or implementation of new mitigation to replace project mitigation credits already used at the mitigation bank in the event of mitigation failure.

The Bank has been designed to provide high quality resources with a wide range of values and functions important to the natural landscape of the Central Valley. Although primarily established to provide wetland habitat values, it is expected that the bank as a whole will provide additional values above those required for project wetland impacts. Therefore, it is agreed that the Bank units may provide credit for other impacted resources (such as Swainson's Hawk foraging habitat). Caltrans may request that specific additional credit be granted for a previously unspecified resource value. Use of mitigation bank credits for other resource values will be determined by an interagency evaluation and approved by the signatory agencies.

IX. MONITORING

Two components of monitoring will be implemented. One component will document progress toward attainment of specific performance criteria for each habitat type for calculation of mitigation ratios. Performance standards will be based upon community-based habitat evaluation procedures (HEP). The community-based HEP will be used to evaluate habitat values at the Bank for the reduction of mitigation ratios. Reduction in mitigation ratios would be based upon achievement of habitat value goals. As these goals are met, mitigation ratios at the Bank would be reduced. The formal performance determinations using community-based HEP will take place when habitats have become established and Caltrans wishes to reduce the mitigation ratios.

The other component of monitoring will be an ongoing program to document habitat values at the Bank. An informal evaluation using community-based HEP may be regularly used as part of the ongoing monitoring evaluations to be implemented for this project. Annual reports documenting site conditions and trends will be prepared and submitted to interested agencies. Extensive habitat evaluation reports will be completed annually by Caltrans for at least the first five years following bank establishment and submitted to each

signatory agency. This report will be used as the evaluation of compensation habitat for exchange until the next monitoring examination or a special evaluation is performed.

Thereafter, Caltrans will continue an informal monitoring program (every other year) to ensure the bank continues to adequately function and provide the required habitat values. A letter will be filed with each agency once a year indicating the bank is adequately functioning and properly maintained and would detail any remedial actions taken during the year.

Upon reasonable notice, any signatory agency can participate in a monitoring survey, or a formal field review. If there is disagreement on the adequacy of the performance, existing values, or the management program, any party may request an interagency evaluation. If determined to be appropriate by the signatory agencies, adjustments or operational changes will be implemented.

X. MANAGEMENT

Caltrans is responsible for ensuring that the bank will be maintained as a high quality natural resource and meet all obligations and commitments of this agreement and those contained in mitigation agreements for which the bank is providing replacement habitat values, during the period in which it exercises control. Caltrans may contract for maintenance and operation with a third party acceptable to the other signatory agencies. Caltrans will provide a funding mechanism to pay for future operation and maintenance of the mitigation bank.

Caltrans, acknowledging its fundamental role as a transportation planning organization and not a natural resource trustee, intends for the U.S. Fish and Wildlife Service (Stone Lakes National Wildlife Refuge) to take eventual ownership and/or conservancy of the bank in perpetuity. The long-term operation and maintenance funding mechanism will be provided to the conservator (U.S. Fish and Wildlife Service) for maintenance of the site in perpetuity. The conservator will adhere to provisions of the Restoration Plan and this Agreement on Mitigation Strategy. Deed restrictions would be implemented upon transfer of the Bank to ensure adherence to the Plan and Agreement. The conservator will be approved by all signatory agencies. When transfer of control and management responsibility of the bank to the U.S. Fish and Wildlife Service has been concluded, Caltrans' long term preservation obligation will be transferred. Caltrans may retain certain responsibilities and/or obligations until exhaustion or relinquishment of any remaining habitat credits and until completion of habitat monitoring requirements.

XI. DEFINITIONS

ACRE-UNIT - A unit of measured area expressed as acreages supporting wetland or riparian habitat and wetland or riparian habitat values not preexisting at the mitigation bank site prior to bank development. Acre-units are used for the mitigation bank accounting processes.

CEQA - The California Environmental Quality Act, California Public Resources Code Sections 21000 et seq.

ENDANGERED SPECIES - Federal definition: An endangered species is any species designated as being in danger of extinction throughout all or a significant portion of its range, excluding insects determined by the Secretary to be pests (16 USC 1532, 50 CFR 424.02). State definition: An endangered species is a native species or subspecies of bird, mammal, fish, amphibian, reptile, or plant that is in serious danger of becoming extinct throughout all or a significant portion of its range (Fish and Game Code Sec. 2062).

HABITAT - The natural environment of an organism; the place where it typically is found.

HYDRIC SOILS - Soils that are saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions that favor the growth and regeneration of hydrophytic vegetation

HYDROPHYTIC VEGETATION - The sum total of macrophytic plant life that occurs in areas where the frequency and duration of inundation or soil saturation produce permanently or periodically saturated soils of sufficient duration to exert a controlling influence on the plant species present.

MITIGATION - The lessening of project impacts by avoidance, minimizing impacts, rectifying the impact, reducing or eliminating the impact over time, or compensating for the impact.

MITIGATION CREDIT - A unit of measured area supporting wetland or riparian habitat and wetland or riparian habitat values not preexisting at the mitigation bank site prior to bank development.

MITIGATION DEBIT - An amount subtracted from the overall available mitigation credit total to compensate for unavoidable transportation project impacts.

NEPA - The National Environmental Policy Act (42 U.S.C. 4321 et seq.).

PERMANENT WETLAND - Permanent soil inundation or saturation by surface water or groundwater resulting in a prevalence of vegetation adapted for life in saturated soil conditions.

PRACTICABLE - Available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes.

PROJECT - Any Caltrans action that has potential effects on the environment.

RIPARIAN HABITAT - Woody vegetation (trees and shrubs) that grows in soils saturated for a substantial portion of the year, especially on the edges of open water (lakes, riverbanks, ditches). For purposes of this Agreement, two classes of riparian habitat are addressed:

1. Forested - The wetland class characterized by woody vegetation that is 6 m or taller.
2. Scrub-shrub - The wetland class characterized by woody vegetation that is less than 6 m tall.

SEASONAL WETLANDS - Soil inundation or saturation by surface water or groundwater occurring periodically during the growing season of the prevalent vegetation, sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Although vernal pools are typically considered a type of seasonal wetlands, vernal pools shall not be considered for mitigation at the Beach Lake Mitigation Bank. Seasonal wetlands dominated by species within the following generalist hydrophyte genera: Juncus, Eleocharis, Scirpus, Polygonum, Cyperus, Carex, and Typha would ordinarily be mitigable at the Beach Lake Mitigation Bank.

THREATENED SPECIES - Federal definition: A threatened species is any species designated as likely to become endangered in the foreseeable future throughout all or a significant portion of its range (16 USC 1532, 50 CFR 424.02). State definition: A threatened species is a native species or subspecies of bird, mammal, fish, amphibian, reptile, or plant that, although not presently threatened with extinction, is likely to become an endangered species in the foreseeable future in the absence of the special protection and management efforts required by the California Endangered Species Act (Fish and Game Code Sec. 2067).

VERNAL POOLS - Vernal pools are seasonally flooded landscape depressions that support a distinctive flora and fauna adapted to periodic or continuous inundation during the wet season. Vernal pools typically are dominated by annual plant species (e.g. Downingia, Psilocarphus, Pogogyne), but may also include some perennials (e.g. Eryngium). Vernal pools shall not be considered for mitigation at the Beach Lake Mitigation Bank.

WETLANDS - Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

WETLAND HYDROLOGY - The area is inundated either permanently or periodically at mean water depths less than or equal to 6.6 feet, or the soil is saturated to the surface at some time during the growing season of the prevalent vegetation.

WETLAND MITIGATION BANK - A single contiguous parcel of land consisting of nonwetland habitat which has undergone those physical changes necessary to create and optimize the acreage and quality of wetland habitat on the site for the express purpose of providing mitigation credits to offset the adverse impacts to wetlands from approved projects elsewhere.

XII. EFFECTIVE DATE, TERMINATION OR MODIFICATION

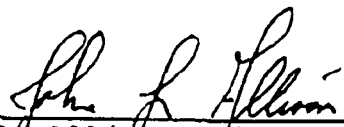
This Agreement on Mitigation Strategy will become effective when approved by the Caltrans District 3 Director, Federal Highway Administration California Division Division Administrator, U.S. Environmental Protection Agency Region IX Water Management Division Director, U.S. Fish and Wildlife Service Sacramento Field Office State Supervisor, U.S. Army Corps of Engineers Chief Construction-Operations Division, and the California Department of Fish and Game Region 2 Manager.

This agreement may be modified with the written approval of all signatories to the Agreement on Mitigation Strategy. Modifications may be proposed by a single or inter-agency team of signatories. Proposed modifications will be submitted for a sixty-day period of review to all signatories.

A signatory may terminate its participation in this agreement upon written notice to all other signatories.

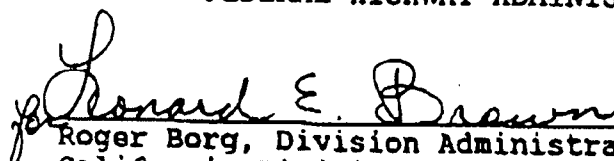
This agreement is intended to supplement, not replace, any existing agreements between any of the parties.

For the CALIFORNIA DEPARTMENT OF TRANSPORTATION


 John L. Allison, District Director
 Caltrans District 3


10-19-93
 Date

For the FEDERAL HIGHWAY ADMINISTRATION


 Roger Borg, Division Administrator
 California Division, Sacramento


12/17/93
 Date

For the U.S. ENVIRONMENTAL PROTECTION AGENCY


 Harry Seraydarian, Division Director
 Water Management Division, Region IX

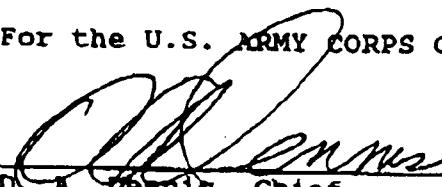
1/13/94
 Date

For the U.S. FISH AND WILDLIFE SERVICE


 Wayne S. White, State Supervisor
 Sacramento Field Office

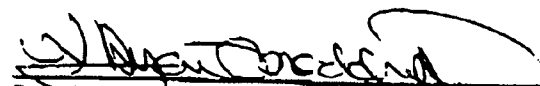
2/23/94
 Date

For the U.S. ARMY CORPS OF ENGINEERS


 D. A. Dennis, Chief
 Construction-Operations Division

3/21/94
 Date

For the CALIFORNIA DEPARTMENT OF FISH AND GAME


 L. Ryan Broddrick, Regional Manager
 Region 2

3/24/94
 Date

MEMORANDUM OF UNDERSTANDING
BETWEEN THE
NORTH CAROLINA
DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
AND THE
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

This is a Memorandum of Understanding (MOU) between the North Carolina Department of Environment and Natural Resources (NCDENR) and the North Carolina Department of Transportation (NCDOT).

- I. Purpose: The purpose of the MOU is to establish a process by which the NCDENR and the NCDOT will cooperate to provide more effective wetland and stream mitigation for transportation construction projects through the development and implementation of local watershed restoration plans designed to improve water quality, fisheries and wildlife habitat, flood protection and recreational opportunities by restoring, enhancing, preserving, and creating wetlands, streams and streamside (riparian) areas.**
- II. The NCDENR and the NCDOT agree to work together to develop a cooperative process for identifying and implementing compensatory mitigation projects within the context of local watershed restoration plans.**

The NCDENR and the NCDOT agree that implementation of this cooperative process will require the following actions:

- A. The development of an agreement that specifies the financial obligations and duties of each agency. Under the agreement, the NCDOT proposes to pay the NCDENR the sum of \$ 17,500,000 in seven (7) annual and equal installments of \$ 2,500,000 in July of 1999, 2000, 2001, 2002, 2003, 2004, and 2005, to produce local watershed restoration plans within watersheds where NCDOT has identified compensatory mitigation needs.**
- B. The development of local watershed restoration plans by NCDENR for watersheds where NCDOT has identified compensatory wetland mitigation needs. The plans will include components that can be used to satisfy compensatory mitigation requirements.**
- C. The establishment of the North Carolina Watershed Restoration Policy Committee (WRPC) with representation from the following state and federal agencies: NCDOT, Division of Water Quality, Wetlands Restoration Program, Division of Coastal Management, Wildlife Resources Commission, Division of Marine Fisheries, Division of Forest Resources, Division of Soil and Water Conservation, Division of Water Resources, Division of Land Resources, Division of Parks and Recreation, U. S. Army Corps of Engineers, Federal Highway Administration, U. S. Fish and Wildlife Service, Natural Resources Conservation Service, National Marine Fisheries Service, Environmental**

Protection Agency, and any other appropriate natural resource agency. The purpose of the WRPC is to review the local watershed restoration plans developed by the NCDENR and identify those components of the plans that could be utilized to satisfy compensatory mitigation requirements for NCDOT. The Wetlands Restoration Program would transmit these recommendations to the U. S. Army Corps of Engineers for consideration.

- D. Commitment by NCDOT to avoid and minimize, to the maximum extent practicable, impacts to certain type of wetland, stream and riparian habitats as identified in advance by the WRPS, or NCDENR in cooperation with NCDOT.
- E. Implementation by NCDOT of the components of the local watershed restoration plans recommended by the WRPC and approved by the U. S. Army Corps of Engineers as appropriate for satisfying compensatory mitigation requirements through payment to the Wetland Restoration Fund, implementation of projects by NCDOT, the purchase of credits from private mitigation banks, or any other mechanism that is consistent with the goals of the local watershed restoration plan and is approved by the U. S. Army Corps of Engineers.

- III. In order to facilitate the establishment of a cooperative relationship between the two agencies for addressing compensatory mitigation

requirements, the NCDENR and the NCDOT agree to operate under the following protocol:

- A. During the period before the full development of the local watershed restoration plans, the NCDOT will consult with the Wetlands Restoration Program and/or the WRPC before initiating any action to search for potential mitigation sites. The NCDOT will provide NCDENR with quarterly updates of estimated impacts to wetlands and streams that incorporate any changes in the Transportation Improvement Program adopted by the North Carolina Board of Transportation.**
 - B. For a period of three (3) years from the effective date of this MOU, if the NCDOT elects to satisfy its mitigation requirements through a source other than the Wetlands Restoration Program, the Divisions of Water Quality and Coastal Management will allow the NCDOT to submit an application without a stream mitigation plan. The NCDOT will submit the stream mitigation plan within twelve (12) months following the date of issuance of the 401 Water Quality Certification. At the time of application, the NCDOT must declare its intent to either pay the appropriate fee to the Wetlands Restoration Program or satisfy its stream mitigation requirements through another source.**
- IV. Open Communication and Cooperation: Both NCDENR and NCDOT acknowledge that it is their desire to facilitate the process set forth in this MOU by open communication and cooperation. Both parties expect to exercise their rights and obligations in good faith as contained in this MOU.**

MEMORANDUM OF UNDERSTANDING
BETWEEN THE
NORTH CAROLINA
DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
AND THE

UNITED STATES ARMY CORPS OF ENGINEERS, WILMINGTON DISTRICT

This is a Memorandum of Understanding (MOU) between the United States Army Corps of Engineers, Wilmington District (hereinafter "Corps") and the North Carolina Department of Environment and Natural Resources, Wetlands Restoration Program (hereinafter "NCWRP").

I. Purpose: The purpose of this MOU is to establish the procedures and guidelines for coordinating compensatory mitigation requirements for Corps permits under Section 404 of the Clean Water Act (33 USC 1344) and the NCWRP. This MOU is intended to provide more effective mitigation for authorized impacts to wetlands, streams and other aquatic resources by allowing permit applicants to choose to pay the NCWRP to provide required compensatory mitigation in circumstances considered appropriate by the Corps, in consultation with Federal and State review agencies.

II. Authority: The Clean Water Act (33 USC 1344) provides that Section 404 is administered by the Secretary of the Army. The Secretary has delegated the authority to administer this permitting program to the U.S. Army Corps of Engineers. As stated in the "Final Notice of Issuance, Reissuance and Modification of Nationwide Permits and Conditions", Federal Register, Volume 61, No. 241, December 13, 1996, "contributions to wetland trust funds," where such fees contribute to the restoration, creation, replacement, enhancement, or preservation of wetlands may be acceptable as compensatory mitigation for wetland impacts authorized by general permits. Similarly, the "Federal Guidance for the Establishment, Use and Operation of Mitigation Banks," Federal Register, Volume 60, No. 228, November 28, 1995, recognizes in-lieu fee arrangements and states that the Corps "may find there are circumstances where such arrangements are appropriate so long as they meet the requirements that would otherwise apply to an offsite, prospective mitigation effort and provide adequate assurances of

success and timely implementation." Contributions to such funds may also be used to provide compensatory mitigation for impacts authorized by individual Section 404 permits when the Corps considers it appropriate. The use of this fund for compensatory mitigation may occur only after the relevant permitted activity has complied with Corps regulations and policy regarding wetland avoidance and minimization.

III. North Carolina Wetlands Restoration Program: The NCWRP was established by an act of the North Carolina General Assembly in 1996. The NCWRP is a non-regulatory program with a statutory mandate to protect and improve water quality, flood prevention, fisheries, wildlife and plant habitats, and recreational opportunities through the restoration, enhancement and preservation of wetlands and riparian areas. The goal of the NCWRP is to restore wetland and riparian area functions and values throughout North Carolina, which will result in a net increase in wetland and riparian area acres, functions, and values in each of the seventeen river basins. It is the intent of the NCWRP to improve the ecological effectiveness of compensatory mitigation through the development of restoration plans to ensure that compensatory mitigation is conducted within an ecosystem context to address identified problems. This proactive approach can provide a consistent and simplified procedure to address compensatory mitigation requirements and foster a comprehensive approach to environmental protection.

The Wetlands Restoration Fund, established as a special trust fund pursuant to NCGS 143.12, will provide a repository for appropriations from the General Assembly, monetary contributions, donations of property, payments to satisfy compensatory mitigation requirements and grants. The enabling legislation for the NCWRP restricts the use of these funds to the restoration, enhancement, preservation and creation of wetlands and riparian areas in accordance with the Basinwide Wetland and Riparian Restoration Plans. In addition, this fund may be used for directly related costs of planning, monitoring and maintenance of wetlands and riparian areas.

IV. Program Operation

A. Basinwide Wetland and Riparian Restoration Plans: Beginning July 1, 1997, the NCWRP will develop comprehensive Basinwide Wetland and Riparian Restoration Plans for each river basin in conjunction with the NC Division of Water Quality's Basinwide Water Quality Management Plans. GIS-based mapping methodologies will be used to

assess the status of the existing wetlands and riparian area resources within the basin and to identify degraded wetlands and riparian areas. Water quality, habitat, fisheries and flood control data will be assessed to identify priority-subbasins within each river basin. In general, one or more priority subbasins will be identified for each Cataloging Unit as shown on the "Hydrologic Unit Map, 1974, State of North Carolina" prepared by the U.S. Geological Survey (Cataloging Unit). For impacts that occur within a Cataloging Unit, restoration sites within the priority subbasins will be identified and prioritized based on the ability of the restored sites to provide the functions and values needed within the Cataloging Unit.

All state and federal agencies involved in the review of Section 404 permits will be provided the opportunity to participate in the development of Basinwide Wetland and Riparian Restoration Plans to ensure the inclusion of restoration and preservation sites of importance to these agencies, and will be provided copies of the Basinwide Wetland and Riparian Restoration Plans as they become available. All compensatory mitigation projects implemented by the NCWRP will be consistent with the Basinwide Wetland and Riparian Restoration Plans. The Corps will consider the Basinwide Wetland and Riparian Restoration Plans when developing mitigation requirements for Section 404 permits.

B. Compensatory Mitigation Requirements: Upon determination by the Corps that impacts to waters of the United States have been avoided and minimized to the maximum extent practicable, and that on-site mitigation is not practicable or in the best interest of the environment, the Corps may allow off-site mitigation for the loss of functions and values resulting from the issuance of Section 404 permits. Where the Corps makes such finding and otherwise deems the use of the NCWRP to be appropriate, the NCWRP, pursuant to the terms of this MOU, may act as a recipient of a specified fee which satisfies the compensatory mitigation requirements of the Section 404 permit, provided that the NCWRP determines that it can meet the mitigation requirements. The Corps will specify the amount (in acres for wetlands or linear feet of stream); type (riparian, non-riparian or stream) as well as classification of habitat type in accordance with Cowardin, et al. (1979) Classification of Wetlands and Deepwater Habitats of the United States,

and/or stream type (cold, cool, or warm water stream); location (river basin and Cataloging Unit); and category (restoration, creation, enhancement, or preservation) of the required compensatory mitigation in the conditions of the Section 404 permit. For stream impacts, mitigation will be performed in the same Cataloging Unit as the impacts authorized, if practicable. If no opportunities exist in the same or immediately adjacent units, then the NCWRP will notify the Corps, and the NCWRP and the Corps will consult on appropriate sites to mitigate for the stream impacts. The NCWRP will play no role in the Corps decision to approve or deny a permit or the Corps decision as to whether compensatory mitigation is a necessary condition of any such permit.

C. **Project Eligibility:** Payment of an in-lieu fee to satisfy compensatory mitigation requirements shall be considered by the Corps on a case-by-case basis.

D. **Payment to NCWRP:** When the Corps determines that compensatory mitigation is acceptable through payment to the NCWRP, and the NCWRP agrees to provide mitigation in exchange for such payment, the Corps will send the NCWRP a copy of the issued permit. The NCWRP will send the permittee an invoice for the appropriate amount of payment. The amount of payment shall be determined by the amount (acres of wetlands or feet of stream) and type of wetland (riparian or non-riparian) of mitigation specified by the Corps in the permit and the Schedule of Fees adopted by the Environmental Management Commission. The NCWRP will notify the Corps and the permittee upon receipt of payment of the specified fee. This letter of notification shall contain the following statement, "The NCWRP, by acceptance of this payment, acknowledges that the NCWRP is responsible for the compensatory mitigation requirements associated with permit or action number _____, and agrees to provide the compensatory mitigation as specified in this permit." Payments from several permittees may be aggregated by NCWRP to fund one or more restoration projects provided that the impacts from these permits and the restoration projects are within the same Cataloging Unit (or immediately adjacent units for stream impacts).

E. Responsibility -- NCWRP: Upon receipt of the appropriate fee from the permittee for compensatory mitigation, the NCWRP will assume the responsibility of mitigation planning, implementation, monitoring, and long-term maintenance and management. Acceptance of this fee is an acknowledgement by NCWRP that the NCWRP, and not the applicant, is responsible for satisfying the compensatory mitigation requirements of the Section 404 permit. In satisfaction of the compensatory mitigation requirements, the NCWRP shall provide compensatory mitigation of the type and in the amount and Cataloging Unit (or immediately adjacent units for stream impacts) specified in the Section 404 permit.

F. Mitigation Plans: All restoration, creation, or enhancement performed by NCWRP to satisfy mitigation requirements of Section 404 permits shall be performed in accordance with a site specific mitigation plan. Each such site specific mitigation plan shall be prepared in general compliance with the guidelines contained in Appendix A of this document, and shall include, but not be limited to, a pre-work description and ecological assessment of the mitigation site, identification of the goals and objectives of the mitigation plan, including a description of the specific aquatic functions to be created, restored, or enhanced, the assessment methodology to be used, a description of the work to be performed on the site, performance criteria to determine the success of the mitigation work, and a monitoring plan to evaluate the site at least annually until performance criteria have been met.

For each mitigation site, the NCWRP shall provide to the Corps a copy of the site specific mitigation plan, and a copy of the final report showing a site has met the performance criteria specified in the mitigation plan, within 30 days of the completion of each such document. The NCWRP shall provide copies of annual monitoring reports for each site upon request.

G. Preservation Sites: For each preservation site acquired by NCWRP to satisfy mitigation requirements of Section 404 permits, the NCWRP shall prepare a report generally describing the site, including an assessment of the functions and values of such site, a description of the anticipated development pressures for such sites, a description of

the long-term management plans for the site, and a description of how the site will be preserved, including copies of executed and recorded real estate documents implementing preservation of the site. The NCWRP shall provide a copy of such report to the Corps prior to utilizing the site as mitigation to satisfy requirements of Section 404 permits.

H. **Time Frame:** To satisfy the compensatory mitigation requirements of Section 404 permits assumed by NCWRP, during the first year of this MOU, the NCWRP agrees to institute projects within 3 years of the date of receipt of payment. During the second year, projects will be instituted within 2 years of the date of receipt of payment. Beginning with the third year, and continuing as long as this MOU is in effect, projects will be instituted within 1 year of the date of receipt of payment. For the purposes of this MOU, the terms "institute" and "instituted" mean that a site has been identified and acquired, and a contract has been issued for the development and implementation of the mitigation project. A construction completion date, not to exceed two years from the date of contract issuance, shall be required for each project. The NCWRP is committed to providing compensatory mitigation for the majority of wetland impacts in advance of the loss of these wetlands.

I. **Protection of Restoration Sites:** The NCWRP will insure that all restoration sites that are used to satisfy compensatory mitigation requirements will remain within the public domain in perpetuity or that appropriate conservation easements in perpetuity, approved by the Corps, are placed on the sites. With approval by the Corps, the NCWRP may transfer ownership or management responsibilities of restoration site properties to appropriate non-profit conservation organizations, local governments, or land trusts for management and monitoring. In all cases, the NCWRP will procure appropriate agreements to insure that both public domain properties and other properties under conservation easements are maintained in perpetuity as viable wetlands sites serving the functions and values required by the permit.

J. **Advisory Team:** In consultation with the Corps, the NCWRP will convene a team that will meet at least annually to review the mitigation projects that have been

implemented or planned to satisfy the compensatory mitigation requirements of Section 404 permits. This team will consist of the NCWRP, the Corps and all other state and federal agencies involved in the review of Section 404 permits. The purpose of this team is to review implemented and planned mitigation projects and to provide recommendations and guidance to the NCWRP concerning potential mitigation sites. The NCWRP will maintain and distribute to each of the members minutes of each meeting of the Advisory Team.

V. **Fiscal Accountability and Record Keeping:** The NCWRP shall hold any funds collected pursuant to this MOU in a separate account within the Wetlands Restoration Fund which is a special trust fund established by NCGS 143-214.12. Interest on these funds shall be credited to this account by the State Treasurer pursuant to NCGS 147-69.2 and 147-69.3. The NCWRP shall account for the funds so held, in accordance with generally accepted accounting principles, and the account shall be subject to audit by the Corps at any time. The NCWRP will provide the Corps with an account statement on an annual basis which states the balance of the fund and the interest earned by the fund. The accounting shall include a summary of direct and administrative costs associated with the implementation, monitoring and long term management of each restoration project. The accounting shall be based on the State's fiscal year (July 1 - June 30) and provided to the Corps by November 1 of each year.

VI. **Annual Review:** The Corps shall be provided with an annual report by November 1 of each year that this MOU is in effect. This report shall include the following information: the administrative costs associated with this MOU; a summary of the monitoring results of projects that have been implemented; an accounting of the amount of restoration, creation, enhancement or preservation that has been conducted in each river basin by Cataloging Unit; an accounting of the acres of mitigation required by Section 404 permits in each river basin by Cataloging Unit; and documentation concerning the implementation of projects in accordance with the time frame specified in paragraph IV. H. The Corps shall review this report and make a determination concerning the continued use of this MOU and/or any adjustments necessary to the MOU by January 1 of each year. Unless the Corps requests a termination or modification of the MOU by

January 1 of each year, the MOU will remain in effect for the next calendar year except as provided in paragraph VIII.

VII. Open Communication and Cooperation: Both the Corps and the NCWRP acknowledge that it is their desire to facilitate the process set forth in this agreement by open communication and cooperation. Both parties agree to exercise their rights and obligations in good faith as contained in this agreement.

VIII. Amendment and Termination: This MOU may be amended or terminated by either party by giving ninety (90) days written notice to the other party. Amendments, but not terminations, require written approval by both the Corps and NCWRP. Prior to termination, the NCWRP shall provide an accounting of in-lieu fees received in satisfaction of compensatory mitigation requirements and in-lieu fee funds disbursed. The NCWRP shall complete all restoration, creation, enhancement or preservation activities necessary to satisfy the compensatory mitigation requirements of the Section 404 permits where payments have been made to the NCWRP to satisfy compensatory mitigation requirements. All compensatory mitigation for which in-lieu fees have been received prior to termination will be satisfied according to the project implementation schedule provided in paragraph IV. G. of this document.

APPENDIX A**NORTH CAROLINA WETLANDS RESTORATION PROGRAM MITIGATION
PLANS AND SPECIFICATIONS CHECKLIST FOR SECTION 404 PERMIT
MITIGATION SITES (April 2, 1998 version)****I. Location Information.**

- A. Watershed by USGS Hydrologic Map Cataloging Unit Number.
- B. County.
- C. Stream name and classification.
- D. Site identified on USGS Quad sheet or NWI map (7.5 minute) (with quad sheet name) and UTM coordinates of site.
- E. Site identified on NRCS Soil Survey with appropriate Sheet Numbers.
- F. Narrative description of location, including roads, nearest municipality, and general description of how to get to the site.
- G. Location map with roads and nearest municipality (not larger than 1"=400').

II. Project Description (should be stated in terms of goals and objectives).

- A. Type of mitigation (restoration, creation, enhancement, preservation).
 - 1. Cowardin classification and/or stream type (cold water, cool water, or warm water).
 - 2. Narrative description of vegetation types to be established or existing.
 - 3. Use of a reference ecosystem in site planning and design and detailed description of that system.
- B. Project Size.
 - 1. Overall site size.
 - 2. Acreage of each type of mitigation intended on the site.

3. Acreage of each vegetation type (by Cowardin classification) intended on the site.
 4. Location map showing each mitigation type and vegetation type.
- C. Wetland and/or stream functions goals and objectives for establishment (if restoration or enhancement) or existing (if preservation).
1. Description of how functions are determined or evaluated, methodologies used, etc. If modeling is used, assumptions, highs, lows, and averages should be included.
 2. Endangered species present or likely in the future or being impacted either positively or negatively.
 3. Description of existing (pre-mitigation project) functions and how the goals of the mitigation will contribute to desired functions and/or values.
- D. Vegetation.
1. Pre-mitigation project description of vegetation of site with appropriate maps.
 2. Mitigation site vegetation goals and objectives.
- E. Wetland Hydrology.
1. Pre-mitigation project description of hydrology of site with appropriate maps.
 2. Mitigation site hydrology goals and objectives with appropriate maps.
- F. Soils.
1. Pre-mitigation project description of soils of site with appropriate maps.
 2. Mitigation site soils goals and objectives with appropriate maps (if changes in the soils are being made).

II. Site Preparation Plan.

- A. Orientation and scale maps (1"-50').
- B. Schematic drawing of proposed changes in topography (3" contours for finished grades). Grading plan.
- C. Location and elevation of all structures, especially those controlling hydrology.
- D. Construction details for all structures.
- E. Spot elevations for low points, high points, and structures. All target elevations and grades mapped.
- F. Construction timetable.
- G. Benchmark locations.
- H. Limits of disturbance.
- I. Areas to be graded and backfilled (or filled). Description of earthwork moving required including amounts, type of soils moved and locations for borrow or relocation, sources of topsoils and the nature of these, grading, etc.
- J. Property boundaries.
- K. Specifications for deconsolidation of substrates.
- L. Stream/channel dimensions and configurations.
- M. Locations, sizes, nature, of existing or proposed buffers and map.
- N. On-site wetland boundaries, existing and after mitigation (proposed).
- O. Areas for stockpiling soils.
- P. Slope stabilization techniques.
- Q. Maintenance procedures for maintaining slopes, grades, etc.
- R. Other important site features and/or considerations.
- T. Habitat structures and locations.

V. Vegetation Plans.

- A. Existing vegetation (description, species composition, relative abundance of dominants and subdominants, forest age, vegetation structure of uplands and wetlands).
- B. Vegetation structure to be restored, enhanced, and/or created (description, species composition, relative abundance of dominants and subdominants, and vegetation structure of uplands and wetlands)(including buffers).
- C. Plantings/seedings should be listed to species. Propagules should be listed as to whether "local" (within 200 miles north and south), and should be verified by a nursery certificate. Acceptable substitute species. Field collection instructions and techniques, if field collection is being used for sources. Plant material guarantees.
- D. If a Reference Ecosystem (RE) is used, the diversity and densities of species within the RE relative to the target for the mitigation site should be discussed.
- E. Transitions zones between wetland and upland should be discussed with regards to suitable transition zone species and planting densities, and composition.
- F. Sources of all plant materials, soils, fertilizers, habitat structures, etc.
- G. Landscaping contractor's responsibilities (fertilization, irrigation or watering requirements, replacing plant mortalities, replanting seeded areas with transplants, temporarily protecting vegetation from wildlife, number of site inspections and frequencies).
- H. Plant handling instructions, seeding instructions, and planting techniques.
- I. Planting timetable.
- J. Schematic drawing of proposed vegetation distribution, spacing, and structure.
- K. Areas to be vegetated identified on topo plans by species and planting methods.
- L. Criteria for acceptable plant material.
- M. Special plant conditioning requirements (brackish/salt marsh species).

- N. Details of proposals for slope stabilization by vegetation.
- O. Exotic and/or nuisance plant control methods.
- P. Vegetative buffer descriptions.

V. Soils Plans.

- A. Soils description and mapping (taxonomy, texture, color structure, permeability, organic content, sampling map, etc.).
- B. Schematic drawing of soils profile and spatial distribution.
- C. Soil amendment details.
- D. Sedimentation and erosion control plan.
- E. Fertility sampling (on mitigation site and on RE if applicable) and discussion of fertility results relative to the needs and requirements of the plantings proposed.
- F. Discussion of appropriateness of soils for the target vegetation and wetland.
- G. If PC farmland is used for a site, a discussion of presence, impacts, and remedies for plow pans, field crowns, herbicide residues and carryover, and the drainage system imposed on the farmland.

VI. Hydrology Plans.

- A. A description (written and shown on plans) of the existing water regime on the site, including water budget, sources, volume, velocity, duration and frequency of inundation and/or saturation, drainage area, seasonal highs and lows for each source, rating of each source as primary, secondary, etc., and average depths of surface and/or subsurface water.
- B. Stream gage/staff gage data and monitoring well data where flooding provides hydrologic input to the site.
- C. Field verification of hydrologic regime.
- D. Depth to water table and dates and methods of measurement with map showing locations of measurements.

- E. Duration of water table within 12 inches of the surface of the ground in consecutive days and dates and methods of measurement (including map showing variations across site).
- F. Map of stream channels, dimensions, and configuration.
- G. Modeling and assumptions, including highs, lows, and averages.
- H. Discussion of water budget regarding its appropriateness for the targeted wetland.
- I. Description, location, and plans of any water control structures and devices.

VII. Stream Plans-All plans for stream restoration shall be developed in accordance with Rosgen methodologies and/or in consultation with the N.C. Wildlife Resources Commission.

VIII. Monitoring Plan.

- A. Detailed description of success criteria for vegetation, soils, hydrology, and functions, including time-lines and targets to be met relative to the timeline. Include a discussion of why the success criteria are appropriate and will measure success.
- B. Detailed description of methods of measuring success criteria, including contractors and individuals and their qualifications for collecting data and performing monitoring measures.
- C. "As-built" report within 30 days of completion of the initial construction and planting.
- D. Observations and measurements of natural regeneration on the site as opposed to the constructed and planted conditions.
- E. Detailed description of monitoring schedule.
- F. Fauna monitoring methods and periods.
- G. Timetable for reporting monitoring results and to whom reports are made.

IX. Maintenance and Contingency Plans.

ENVIRONMENTAL GUIDANCE

BACKGROUND

To complete some follow-up Roles and Responsibilities work introduced by Region Roundtable in mid-1999, Jeff Scheick and Paul Mather (Roundtable members) were asked to pull together a small group to resolve issues raised regarding ODOT's Environmental Program (Environmental Guidance Group). Since December, the Environmental Guidance Group has been meeting to develop a work plan and some high-level guidance consistent with Region Roundtable's request. The following are the group's work products, to date.

ENVIRONMENTAL STEWARDSHIP

ODOT Environmental Guidance Statement:

ODOT will carry out its mission consistent with sound environmental stewardship and best management practices. We strive to meet the spirit and intent of environmental laws. We comply with regulations, and we will enhance the environment, balancing such enhancement with the scope and purpose of our ODOT mission.

Valuing Oregon's environment is the responsibility of every ODOT employee and it is reflected in our decisions and actions.

Best Management Practices

Many state and federal laws govern environmental work. These laws determine the process to follow when securing permits or "permission" to affect a protected resource. The Endangered Species Act (ESA) is an example of this type of law. ODOT must adhere to this law which prohibits jeopardizing protected species or harming habitats.

With the escalating cost of environmental compliance over the last few years, there is more pressure and growing scrutiny to avoid unnecessary environmental costs. Typically, environmental compliance adheres to the concept of "sequencing." Borrowed specifically from wetlands compliance work, sequencing says that the normal course or "sequence" of work shall follow an orderly, prioritized progression in order of occurrence:

- **AVOIDANCE** – Avoidance of the resource is the highest priority. The best stewardship of the resource is to avoid harm in the first place.
- **MINIMIZATION** – If the resource cannot be avoided, then minimize harm to the resource to the maximum extent possible and practicable.
- **MITIGATION** – When the resource cannot be avoided, and when minimization leaves harm to the resource, mitigate or offset the harm. Usual mitigation is in-place and in-kind, but more creative, productive, and cost-effective mitigation is being sought. However, some regulatory agencies are very restrictive in their response to deviations from standards. As a last resort, compensation may be approved when resource mitigation is impossible, cost prohibitive, impractical or ill advised.

Environmental Enhancement Defined

Enhancement with respect to the environment is an opportunity to be considered, as opposed to a requirement. Enhancement includes activities that go beyond the agreed upon regulatory requirements, whether in planning, design, construction, maintenance, or operations. For ODOT, enhancement is:

1. Above and beyond required mitigation and routine maintenance.
2. More than truly "routine and customary" work.
3. Related to transportation.
4. Opportunistic and typically low-cost when compared to the main activity
5. An extension of work already underway.
6. Identified in the 1990 FHWA Environmental Policy Statement and the 1999 Oregon Highway Plan (see p. 131, Goal 5).

Environmental Enhancement-Related Decision Making

ODOT is committed to following both the spirit and intent of environmental laws, and sometimes exceed the requirements through enhancements. When deciding whether to take advantage of an enhancement opportunity, a number of factors must be balanced. These include: magnitude and severity of impact, regulatory desires and requirements, mitigation (habitat) establishment and performance over time, professional opinions, and business line interests and budgets. This is a difficult task and can easily become subjective in spite of the best scientific methods.

Not all projects provide opportunities for enhancement. However, sound environmental stewardship requires that on all projects, decision-makers be mindful of environmental enhancement opportunities when they surface, and take advantage of them when appropriate. As in any complex decision-making activity, enhancement opportunities must be balanced with other equally important, sometimes competing business interests.

ENVIRONMENTAL ROLES & RESPONSIBILITIES

When making environment-related decisions, Transportation Operations Division managers, field staff, and the environmental community (Environmental Services, Regional Environmental Coordinators, Environmental Operations Staff, Permits Staff, etc.) share the responsibility to balance competing business needs and requirements with appropriate environmental stewardship. Schedule, cost, safety, quality, public input, and regulatory input are all important. All of these factors must be weighed thoughtfully and lead to a comprehensive decision.

The following clarity around organizational roles, responsibilities, and authority is to help reduce disagreements with respect to environmental decision-making. This direction is provided to enhance the current level of collaboration internally. Please keep in mind it is the responsibility of each individual involved to resolve disagreements around competing priorities directly, at the lowest level. However, in cases where this is not possible, each should consult his/her manager for assistance in achieving an acceptable resolution.

Roles, Responsibilities, and Authorities for Transportation Operations Division Employees

All Transportation Operations Division Employees:

- Use ODOT's Environmental Guidance Statement in their work,
- Make sound environmental decisions on the job, by balancing environmental needs with ODOT mission, schedule, budget, safety, product quality, public input, and regulatory input,
- Collaborate with the ODOT environmental community to raise and resolve environmental issues,

- Seek to learn and employ best management practices when making environment-related decisions,
- Participate in ODOT team environmental learnings meetings,
- Seek help to identify and mitigate sensitive environmental resources,
- Use environmental tools available (salmon and resource mapping, seasonal maintenance practices, Routine Road Maintenance, Water Quality and Habitat Guide).

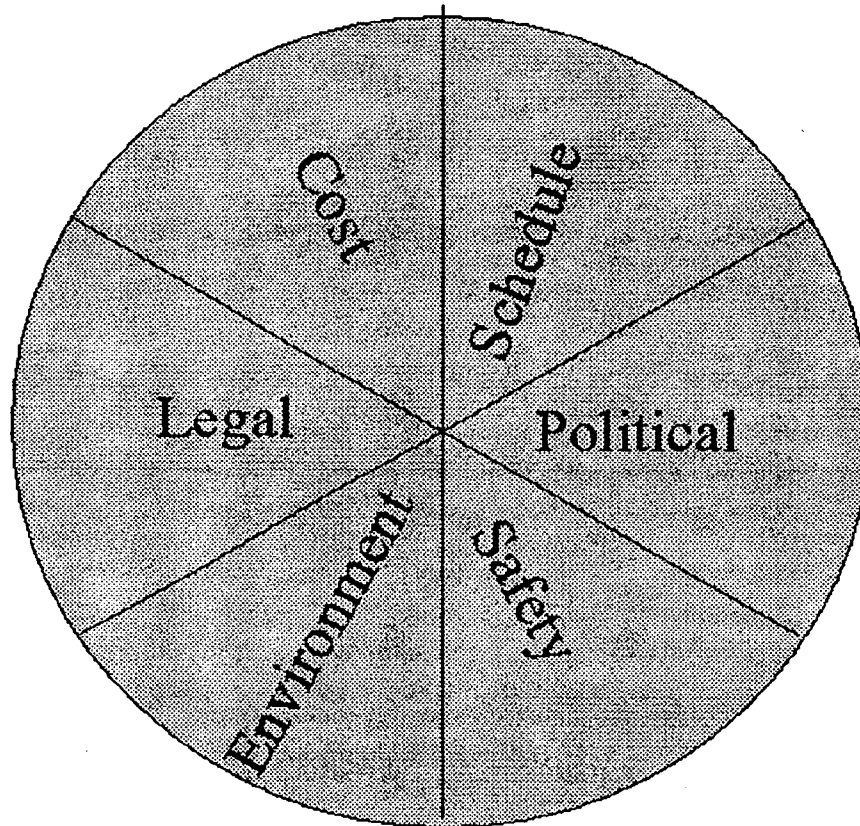
Transportation Operations Division Managers: In addition to the roles, responsibilities, and authorities presented in the ODOT Employees section above, they will:

- Determine when they and their crews need environmental help - and get it,
- Seek environmental education for staff (including supporting educational programs like the Environmental Learnings Program, where appropriate),
- Fulfill requirements of environmental policy, streamlining, and other environmental directives,
- Demonstrate accountability for satisfying regulatory agency and permit requirements,
- Develop and track fulfillment of environmental responsibilities and expectations,
- Set environmental expectations for crews,
- Work collaboratively to resolve environmental issues brought to their attention and that cannot be resolved among staff members reporting to them.

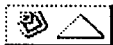
Environmental Staff: In addition to roles, responsibilities, and authorities presented in the Transportation Operations Division Employees section above, the staff, of ODOT's environmental community will:

- Serve as the Department's environmental specialists and experts,
- Provide regulatory interpretation and guidance,
- Educate and inform Transportation Operations Division staff and others on environmental topics, ensuring standardization in training on environmental issues across the state (e.g., utilize and support programs like the Environmental Learning Program),
- Produce environmental studies and documents as required,
- In collaboration with customers, lead the Department leaders in developing environmental policy, streamline environmental processes, and implement environmental guidance,
- In concert with project teams, commit the Transportation Operations Division to responsible environmental actions, balance environmental work with ODOT's mission and use the NEPA process as a primary guidance tool,
- Provide environmental professional services for maintenance, construction and planning projects, serve on project teams,
- Develop avoidance, minimization, and mitigation strategies for successful projects,
- Negotiate with regulatory agencies on behalf of ODOT,
- Expand personal expertise on environmental practices through national and state involvement (AASHTO, TRB, Streamlining, etc.),
- Serve as a resource group for the public as well as other agencies.

Decision Making Balance Wheel



ATTACHMENT B



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- B. County.
- C. Stream name and classification.
- D. Site identified on USGS Quad sheet or NWI map (7.5 minute) (with quad sheet name) and UTM coordinates of site.
- E. Site identified on NRCS Soil Survey with appropriate Sheet Numbers.
- F. Narrative description of location, including roads, nearest municipality, and general description of how to get to the site.
- G. Location map with roads and nearest municipality (not larger than 1"=400").

II. Project Description (should be stated in terms of goals and objectives).

- A. Type of mitigation (restoration, creation, enhancement, preservation).
 - 1. Cowardin classification and/or stream type (cold water, cool water, or warm water).
 - 2. Narrative description of vegetation types to be established or existing.
 - 3. Use of a reference ecosystem in site planning and design and detailed description of that system.
- B. Project Size.
 - 1. Overall site size.
 - 2. Acreage of each type of mitigation intended on the site.

3. Acreage of each vegetation type (by Cowardin classification) intended on the site.
 4. Location map showing each mitigation type and vegetation type.
- C. Wetland and/or stream functions goals and objectives for establishment (if restoration or enhancement) or existing (if preservation).**
1. Description of how functions are determined or evaluated, methodologies used, etc. If modeling is used, assumptions, highs, lows, and averages should be included.
 2. Endangered species present or likely in the future or being impacted either positively or negatively.
 3. Description of existing (pre-mitigation project) functions and how the goals of the mitigation will contribute to desired functions and/or values.
- D. Vegetation.**
1. Pre-mitigation project description of vegetation of site with appropriate maps.
 2. Mitigation site vegetation goals and objectives.
- E. Wetland Hydrology.**
1. Pre-mitigation project description of hydrology of site with appropriate maps.
 2. Mitigation site hydrology goals and objectives with appropriate maps.
- F. Soils.**
1. Pre-mitigation project description of soils of site with appropriate maps.
 2. Mitigation site soils goals and objectives with appropriate maps (if changes in the soils are being made).

III. Site Preparation Plan.

- A. Orientation and scale maps (1"-50").
- B. Schematic drawing of proposed changes in topography (3" contours for finished grades). Grading plan.
- C. Location and elevation of all structures, especially those controlling hydrology.
- D. Construction details for all structures.
- E. Spot elevations for low points, high points, and structures. All target elevations and grades mapped.
- F. Construction timetable.
- G. Benchmark locations.
- H. Limits of disturbance.
- I. Areas to be graded and backfilled (or filled). Description of earthwork moving required including amounts, type of soils moved and locations for borrow or relocation, sources of topsoils and the nature of these, grading, etc.
- J. Property boundaries.
- K. Specifications for deconsolidation of substrates.
- L. Stream/channel dimensions and configurations.
- M. Locations, sizes, nature, of existing or proposed buffers and map.
- N. On-site wetland boundaries, existing and after mitigation (proposed).
- O. Areas for stockpiling soils.
- P. Slope stabilization techniques.
- Q. Maintenance procedures for maintaining slopes, grades, etc.
- R. Other important site features and/or considerations.
- T. Habitat structures and locations.

IV. Vegetation Plans.

- A. Existing vegetation (description, species composition, relative abundance of dominants and subdominants, forest age, vegetation structure of uplands and wetlands.
- B. Vegetation structure to be restored, enhanced, and/or created (description, species composition, relative abundance of dominants and subdominants, and vegetation structure of uplands and wetlands)(including buffers).
- C. Plantings/seedlings should be listed to species. Propagules should be listed as to whether "local" (within 200 miles north and south), and should be verified by a nursery certificate. Acceptable substitute species. Field collection instructions and techniques, if field collection is being used for sources. Plant material guarantees.
- D. If a Reference Ecosystem (RE) is used, the diversity and densities of species within the RE relative to the target for the mitigation site should be discussed.
- E. Transitions zones between wetland and upland should be discussed with regards to suitable transition zone species and planting densities, and composition.
- F. Sources of all plant materials, soils, fertilizers, habitat structures, etc.
- G. Landscaping contractor's responsibilities (fertilization, irrigation or watering requirements, replacing plant mortalities, replanting seeded areas with transplants, temporarily protecting vegetation from wildlife, number of site inspections and frequencies).
- H. Plant handling instructions, seeding instructions, and planting techniques.
- I. Planting timetable.
- J. Schematic drawing of proposed vegetation distribution, spacing, and structure.
- K. Areas to be vegetated identified on topo plans by species and planting methods.
- L. Criteria for acceptable plant material.
- M. Special plant conditioning requirements (brackish/salt marsh species).

- N. Details of proposals for slope stabilization by vegetation.
- O. Exotic and/or nuisance plant control methods.
- P. Vegetative buffer descriptions.

V. Soils Plans.

- A. Soils description and mapping (taxonomy, texture, color structure, permeability, organic content, sampling map, etc.).
- B. Schematic drawing of soils profile and spatial distribution.
- C. Soil amendment details.
- D. Sedimentation and erosion control plan.
- E. Fertility sampling (on mitigation site and on RE if applicable) and discussion of fertility results relative to the needs and requirements of the plantings proposed.
- F. Discussion of appropriateness of soils for the target vegetation and wetland.
- G. If PC farmland is used for a site, a discussion of presence, impacts, and remedies for plow pans, field crowns, herbicide residues and carryover, and the drainage system imposed on the farmland.

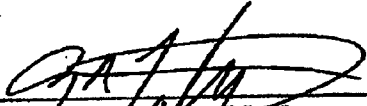
VI. Hydrology Plans.

- A. A description (written and shown on plans) of the existing water regime on the site, including water budget, sources, volume, velocity, duration and frequency of inundation and/or saturation, drainage area, seasonal highs and lows for each source, rating of each source as primary, secondary, etc., and average depths of surface and/or subsurface water.
- B. Stream gage/staff gage data and monitoring well data where flooding provides hydrologic input to the site.
- C. Field verification of hydrologic regime.
- D. Depth to water table and dates and methods of measurement with map showing locations of measurements.

- E. Duration of water table within 12 inches of the surface of the ground in consecutive days and dates and methods of measurement (including map showing variations across site).
 - F. Map of stream channels, dimensions, and configuration.
 - G. Modeling and assumptions, including highs, lows, and averages.
 - H. Discussion of water budget regarding its appropriateness for the targeted wetland.
 - I. Description, location, and plans of any water control structures and devices.
- VII. Stream Plans-All plans for stream restoration shall be developed in accordance with Rosgen methodologies and/or in consultation with the N.C. Wildlife Resources Commission.
- VIII. Monitoring Plan.
- A. Detailed description of success criteria for vegetation, soils, hydrology, and functions, including time-lines and targets to be met relative to the timeline. Include a discussion of why the success criteria are appropriate and will measure success.
 - B. Detailed description of methods of measuring success criteria, including contractors and individuals and their qualifications for collecting data and performing monitoring measures.
 - C. "As-built" report within 30 days of completion of the initial construction and planting.
 - D. Observations and measurements of natural regeneration on the site as opposed to the constructed and planted conditions.
 - E. Detailed description of monitoring schedule.
 - F. Fauna monitoring methods and periods.
 - G. Timetable for reporting monitoring results and to whom reports are made.
- IX. Maintenance and Contingency Plans.

IX. Signatures: This MOU shall become effective when signed by both the Corps and the NC Department of Environment and Natural Resources, Division of Water Quality.


For the U.S. Army Corps of Engineers, Wilmington District



Terry B. Youngbluth
Colonel, U.S. Army
District Engineer

11 November 1998
Date

**For the North Carolina Department of Environment and Natural Resources
 Division of Water Quality**



A. Preston Howard, Jr., P.E.
Director

10-8-98
Date

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